VOLUME 11 NUMBER 1

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

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Fig. 642. No. 22.

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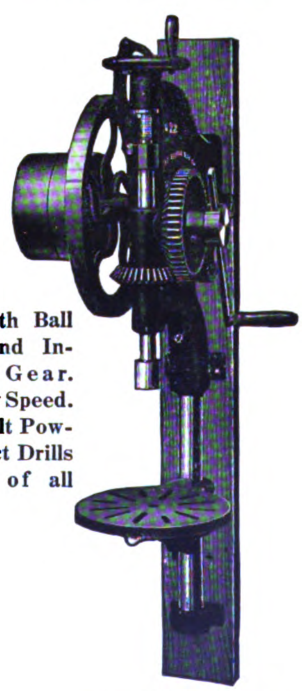

Fig. 644. No. 22.

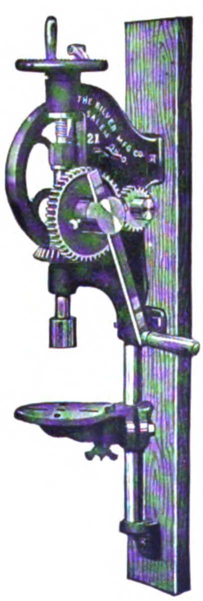

Fig. 641

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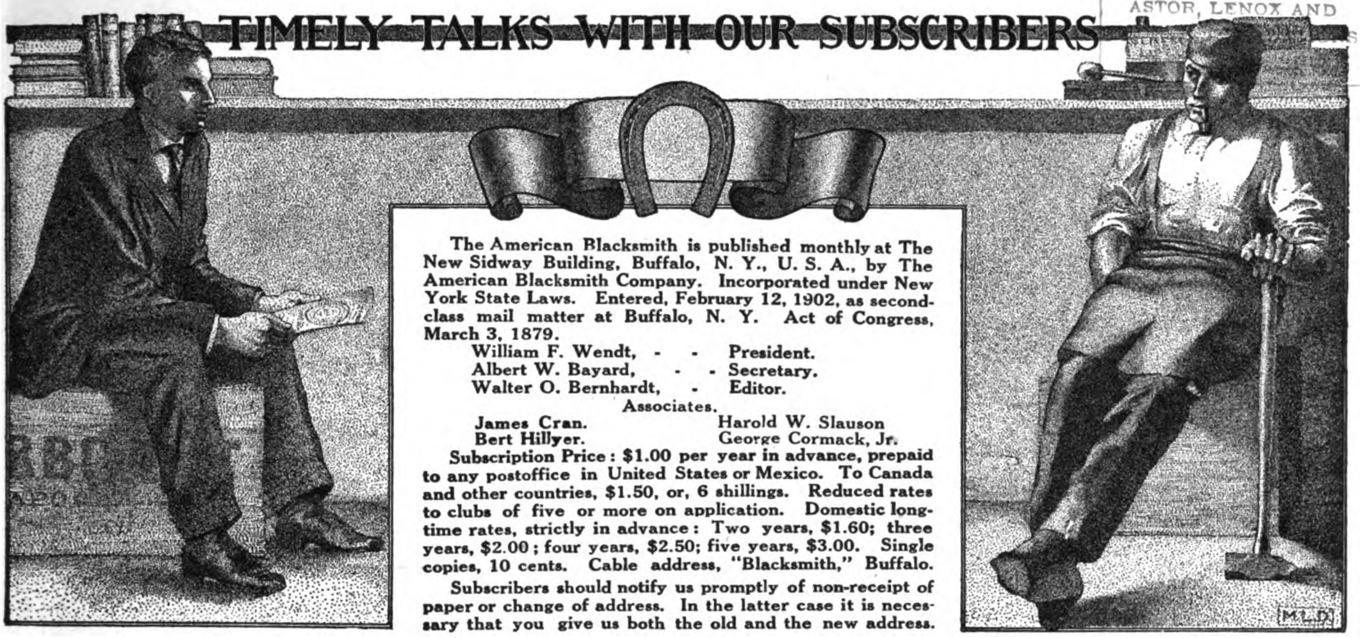

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Arrangements will also be made with the secretaries of the larger associations to handle American Blacksmith Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

Lower Rates in Canada

This little talk is especially with our Canadian friends. For some time we have been trying to reduce our subscription rate to Canadian readers, and we have now at last succeeded in reducing it very materially. Beginning October first, the subscription rate on The American Blacksmith for delivery in the Dominion of Canada will be $1.25 instead of $1.50 as heretofore. And while this very material reduction has been made on a single year's subscription the reduction in Canadian long-time rates is still more. For example:

2 years' subscription	$2.00
3 years' subscription	2.70
4 years' subscription	3.20
5 years' subscription	3.75
10 years' subscription	7.00

Every reader must admit that these revised rates are exceptionally liberal ones, and this reduction will enable Canadian readers to take advantage of our long-time rates at slightly greater cost than readers residing within the borders of the United States.

This reduction will also enable our Canadian readers to be much better represented on "Our Honor Roll". There should certainly be more Canadian readers listed in our honor columns.

Contents, October, 1911

Mistakes and "Our Journal"

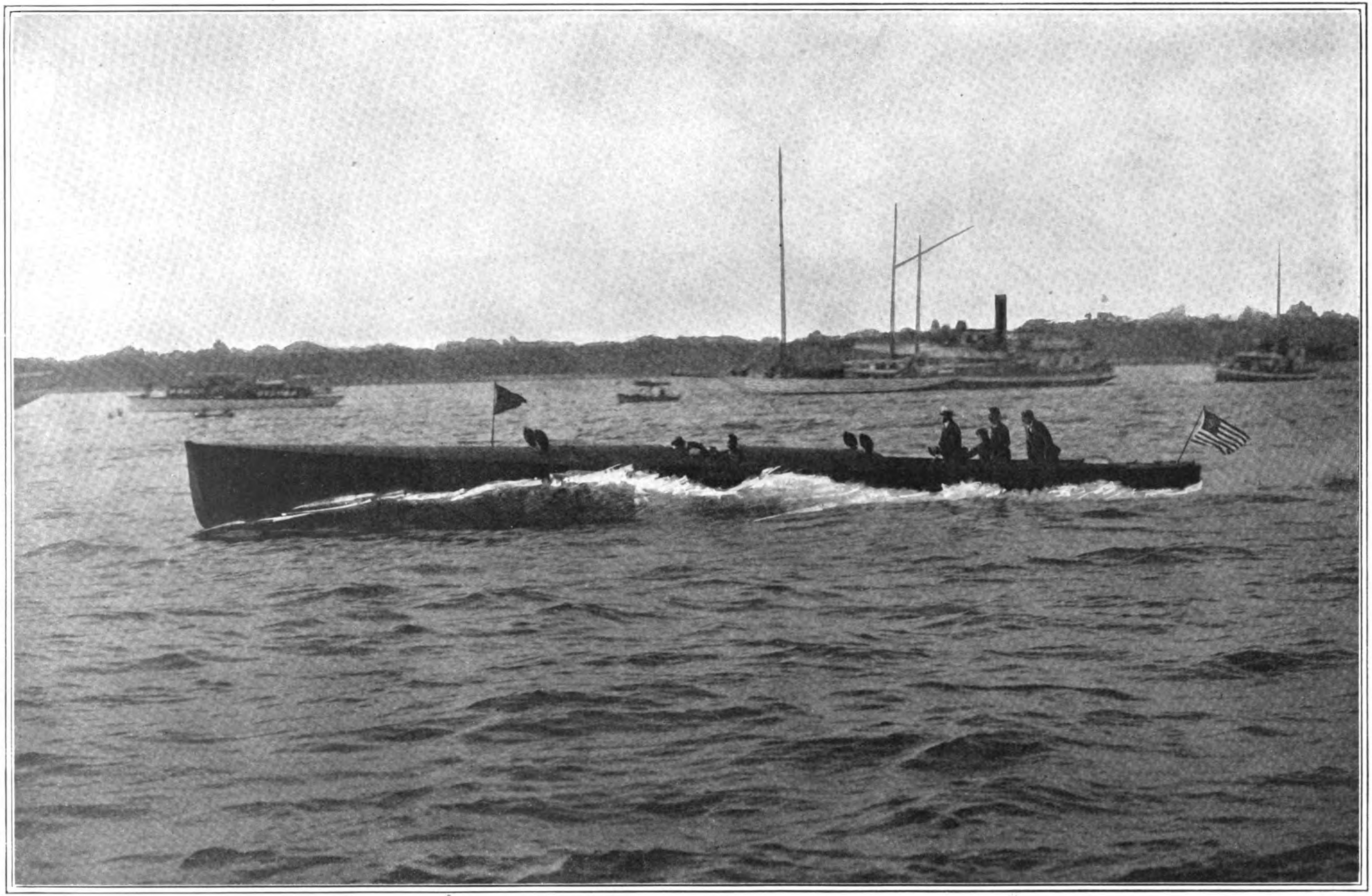
With 25,000 and more readers, it is inevitable that we should make mistakes. Sometimes these mistakes can be laid at the door of the postoffice; sometimes even readers themselves are at fault; but we are free to admit that we are only human and that we make mistakes ourselves. But we make conscientious efforts to correct our mistakes whenever they are brought to our attention. We would a hundred times rather sacrifice our small margin of profit than to lose the friendship and good will of a subscriber. So, if you have any complaint to make or if you think there has been any error made in your transactions with us, you will do us a big favor by reporting the error immediately. We strive constantly to do a little bit more than only what is right, but we cannot of course correct mistakes of which we know nothing. If you do not receive your paper regularly; if it does not come addressed correctly, or if you have any other reason for complaint, give us a chance to correct the matter or to keep you satisfied. You will always find us more than willing to do the fair and square thing—just give us a chance.

"Our Journal" the Only One

We got a letter from an Indiana reader the other day which we are quite sure will interest you. This subscriber in sending us his renewal subscription wrote as follows:

"Please find enclosed one dollar to renew my subscription. I consider that I could not do without the paper for several times that amount. I have never failed to find something new in each copy. It keeps the workers of the craft posted on what the up-to-date workers are doing and how they do it. I have gotten several hints that helped me and which I never would have gotten except through The American Blacksmith."

Hasn't your experience been practically the same as this Indiana reader's? If The American Blacksmith is so valuable to this man, to yourself and to some 25,000 other smiths, don't you think that your neighbor will find it worth reading? Show him this copy of the paper; tell him what you think of the paper; let him read the above letter and then send in his subscription order and we will give you six months' credit on your own account. Why not talk to your neighbor right now?



A GASOLINE MOTOR BOAT, HIGH SPEED TYPE, SIXTY FEET LONG WITH A SPEED OF OVER THIRTY MILES AN HOUR

Welding Locomotive Frames With Fuel Oil

How We Repair Frames While in Position Under the Engine

D. M. DULIN

Master Smith, Norfolk & Western Railroad

WE have a great many broken frames, and if we had to remove them it would cause us a vast amount of delay, besides the many troubles incident to such work, for our facilities for handling such work are not the best in the land. When we have broken frames it is up to us to repair them, and we find it necessary to use means and methods more speedy than the coal forge and anvil, and we are pleased to say that the methods employed here by which we weld frames with fuel oil is a howling success.

We seldom remove a frame unless it is badly out of line or broken under extension. Since the first of the year and up to date we have put up forty-three jobs with but three failures, and two of these were on the front jaw of a passenger engine. This frame had been removed at some time and a new back put in the front jaw. In this operation the height of the front limb was shortened ⅞ inch, causing excess of stock in the front corners of the jaw, and this striking on driving box caused the frame to break. This frame had to be taken down and put up to standard.

I will now endeavor to explain our method of welding frames with oil: We drill a 1-inch hole through the fracture, making the holes as close as possible. This process catches most of the irregular fractures, after which we chip out all of the burrs, leaving the ends nice and square. Then we wedge our frame apart, about the distance equal to the amount of contraction. We do not figure on any upset, but anchor our frame at this point and leave it until the heat is worked off, after which we release the wedge which permits the frame to go back to proper length. When the frame is wedged apart we forge a piece to fit in the fracture. This is cut from the end of a square block of tough, hammered iron having the fibers running with the frame. It is fitted in nicely, leaving about ½ inch above the frame and ½ inch below, allowing the sides to come flush. Then we forge two more pieces, one for each side of the frame. These are 3 or 4 inches wide, with length to suit height of fracture, leaving the fibers running with the frame the champfer comes nicely to an oval shape. Then we drill one or two ⅝-inch studholes through the plates and into center piece, tap out center piece, screw in studs, put on plates and rivet over. This gives a good fiber and saves a mean job of forging T-shaped pieces and getting them machined to fit. We then proceed to build our furnace. We throw two 1-inch square bars across the frame, and have four small chains with a ring in one end and a hook in the other with which we get any desired height for our furnace. We have two short bars hanging in lower ends of chain on which we place a piece of sheet iron. This forms the foundation of the furnace, which is 18 inches deep, having the length of two firebricks and giving us about 2 inches above and below the frame. We find that a reasonably long heat will not waste as much as a heat

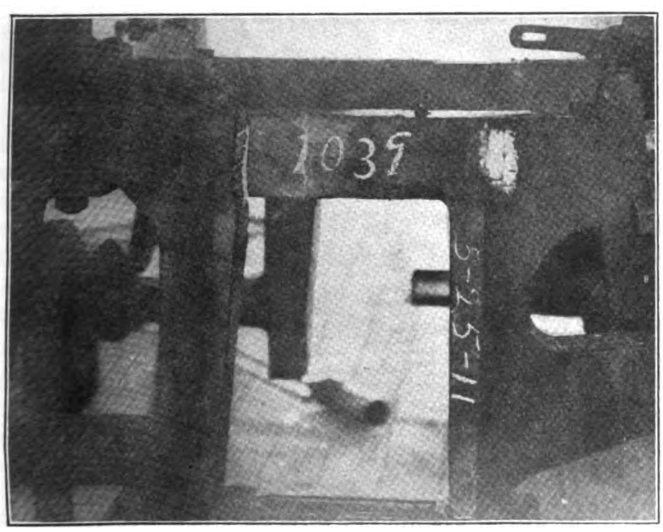


FIG. 1—SHOWING FIRST OPERATION OF CUTTING OUT FRACTURE WITH ONE-INCH DRILL AND CHIPPING.

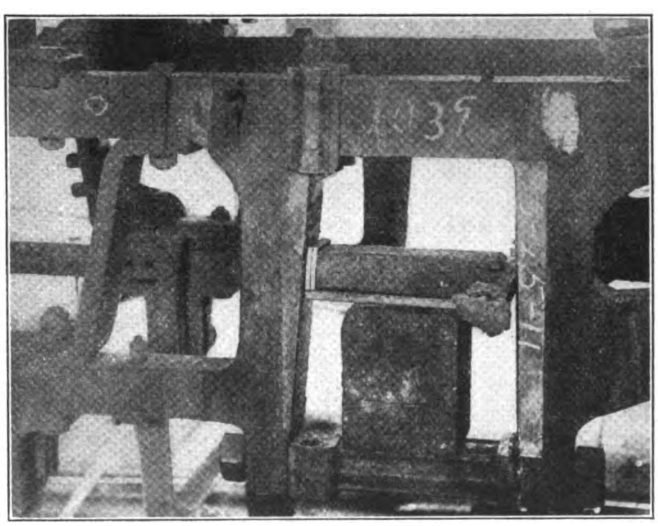


FIG. 2—SHOWING PIECE INSERTED IN CENTER AND PADS PUT ON EACH SIDE WITH STUDS

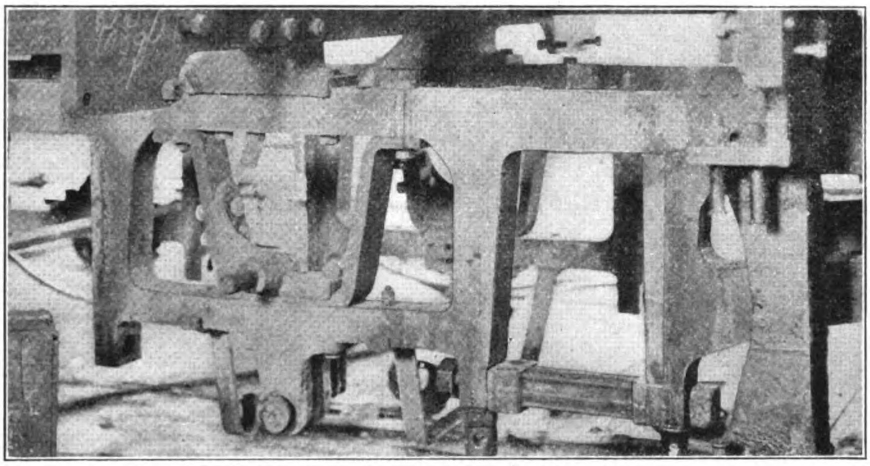


FIG. 3—SHOWING HEAT TAKEN, PADS RAMMED IN AND JOB COMPLETED

that is crowded. As you will note, our furnace is of large dimensions and is capable of containing a good deep heat, which is something to be appreciated, especially if your air is weak.

On the inside of the frame the furnace is 9 inches deep, and length of one firebrick. This side is plugged. When all is in readiness we light the burner. This is placed on an iron trestle with adjustable limbs giving any desired height. All the while the heat is being directed against the frame. We have two rams, one of which is made from 1-inch bar soft steel, 10 feet long, and upset on one end the size of a backing hammer. The other is made from 1½-inch steel, upset on one end about 3 inches. We use the small bar to stick the pad on side of frame and when it gets white and soft we use the larger ram.

This is handled by three helpers who drive the pad into the frame. The operation is continued until we have sufficient proof that a good weld is accomplished, after which we turn off the burner and plug up the furnace and then we repair to the other side which is treated to the same dose. After this we take down our furnace and trim down the top and bottom.

This ramming process moves the stock half way through from each side and effectually closes any vacuum and makes a perfect weld. A deep, mellow heat is infused into the frame. and the pads on the side of frame furnish plenty of stock to work on.

We have done many jobs which have appeared as well as any that came from the anvil and with much better heat and conditions, on account of the superiority of the heat obtained from oil over that gotten out of very inferior coal.

We also have a large sized air hammer for trimming up, and gouges and chisels of different lengths and designs which come very handy when you cannot swing a sledge.

We always leave the frame a little thicker than the original size and a slight increase in height, if we have room.

I feel that our manner of welding frames is of the first quality, as the work is done with four men, and is also done with despatch. The accompanying engravings show the successive steps in the operation of welding a frame.

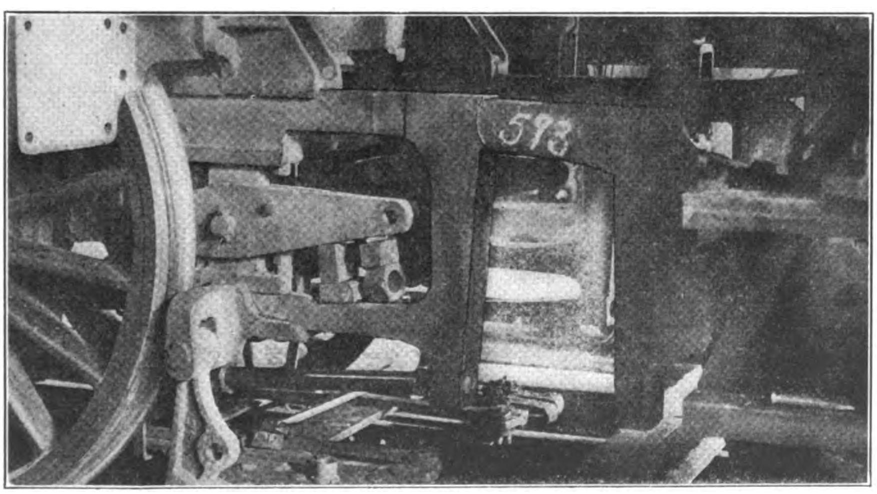


FIG. 4—SHOWING A SIMILAR JOB WELDED IN FRONT CORNER OF JAW BY SAME PROCESS. AFTER THREE MONTHS' SERVICE FRAME BROKE IN OPPOSITE CORNER

Piece Work and Shop Kinks As Applied In the Smith Shop

HENRY MANGEOT

For the past fifteen or eighteen years I have been an advocate of piece work and I think that the solution of the wage and work problem in smith shops would be the installation of piece work in all shops.

About fourteen years ago there was only about 1% of piece work done in the smith shops throughout the country. This has gradually increased from that time until the present. day. I think I would be safe in stating that at least 65% of present day work is piece work.

It has been demonstrated that not only the employee is benefited, but the employer also. I have in mind a certain shop that had sixteen fires in operation and these were scarcely able to keep up with the average output of locomotives.

Piece work was installed in this shop on a small scale and at the same time installed in the machine shop. It was indeed a hard proposition to get the piece work installed, but after quite a great deal of persuasion the men took a hold of it and saw the increased advantages to themselves from the financial point of view as well as the increase in their daily output per man.

The men did not seem to exert themselves much harder than they did at their daily work, but they made every move count. It was unnecessary for the foreman to get after a man for taking two heats when one would have answered the purpose. It was for the man's advantage to see to that part of the work himself and not make any unnecessary work for himself as, when he did, it was decreasing his net earnings per day.

The hand tools which belong to the ordinary smith in a piece-work shop are kept in a much better condition than those in a day shop, for the reason that every smith working piece work keeps a complete set of tools on hand and in a first class condition. His tongs, cutters, punches, etc., are well looked after and cared for.

The shop to which I referred above worked that sixteen fires before installing piece work. To-day they are working eleven fires and producing more work than they did with the sixteen fires. The machine shop also increased its output, and this would naturally require the smith shop to increase.

The same foreman is supervising the above shop with practically the same class of men he had in the start. There were some lazy mechanics who could not keep up with the pace who were compelled to step down and out, as there is no question but that piece work will rid your shops of a certain number of drones, as you will find the average piece worker is a hustler.

It stands to reason that among the American wage earners, in fact any other nations, that the first consideration is that of their daily earnings; and when a man can work with his head as well as his hands and make from fifty to seventy-five cents more a day by working piece work he will naturally take to it. And it has been my experience when a man once gets the taste of working piece work you generally have trouble on your hands when you ask this same mechanic to work day work.

While it is true that some men are naturally more speedy than others, my experience has been that the company is always fair in making prices on their work and generally base them on a man doing a fair day's work. The piece-work inspector should be a diplomat among his men, a close observer and by all means fair and honest; as a dishonest piece-work inspector is about as dangerous a man to have around the shop as a dishonest cashier in a bank.

The inspector generally fills a position as assistant foreman in a blacksmith shop, and is among the men at all times, checking them up and inspecting their work and giving such orders as may be in his line. And, from what I can see from the different mechanical papers, nearly all the modern trunk lines in the country are taking very favorably to piece work.

I believe it can be more satisfactorily worked in a large shop that does a great deal of manufacturing; as one man can be assigned to making some particular forgings for a day or two at a time or possibly a week. Or one man may be assigned to making one particular forging which can be handled by the simplest method of piece work. It can also be handled in a shop no matter how small; you may have a variety of different classes of work each day; but it is a little more difficult to work piece work in this kind of a shop than it would be in the one mentioned above.

Piece work and shop kinks go hand in hand. You take a piece-work shop with a fine collection of shop kinks and it is surprising to see the output that shop can put forth per smith. I suppose the majority of smith foremen are situated a good deal as I am myself. Our road is busy, our shops are stocked up with more work than our appropriation will allow us to handle, and this is one of the stumbling blocks of holding us back from manufacturing more shop kinks; as it requires the utmost efforts of every mechanic to keep our power running.

My idea is that naturally every smith foreman is of an inventive mind and could be placing a great deal more shop kinks into his shop had he the appropriation to allow him to manufacture it. That is why I believe that there should be a liberal appropriation set aside for the tool room, for the benefit of making shop kinks for blacksmith shops and any other shops which might be benefited.

I hardly believe it is necessary to attempt to enumerate the different kind of shop kinks that would be useful, as there are so many in nearly every shop that it would take up much time to attempt it, but just to illustrate a case, I went into a shop some time ago where they were forging out some three-inch hexagon nuts for crank pins under the hammer and drilling them in the machine shop, whereas it could have been cut and punched under a hammer all at one operation.

Another thing that attracted my attention was a man forging out wrenches both open and box end by the old method and by hand; while we were manufacturing the same wrench in our shop with a drop forge system under our hammer, making a complete wrench finished

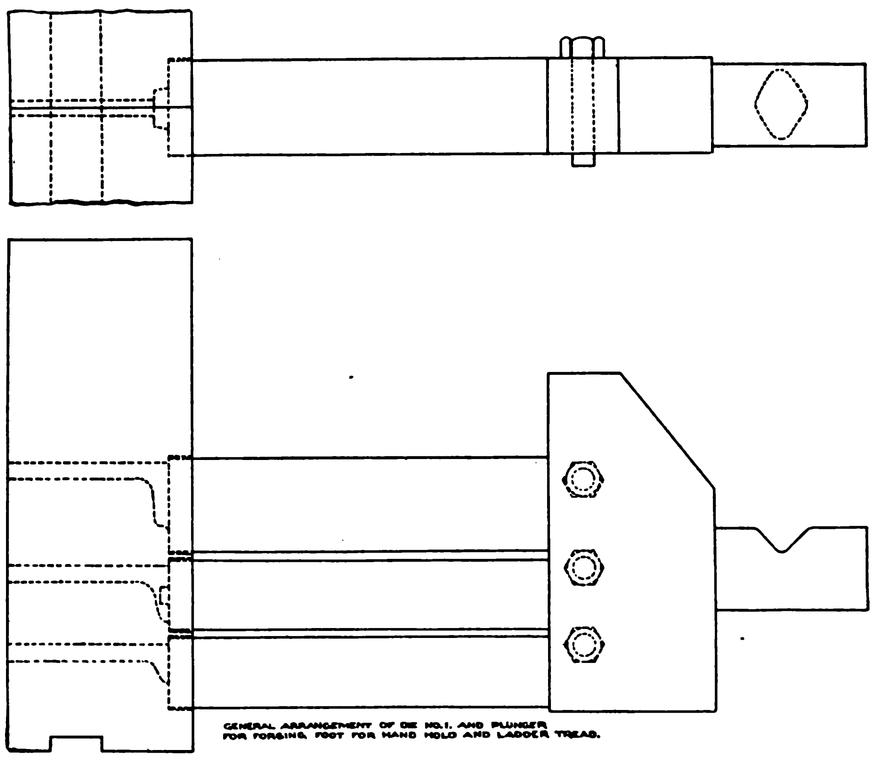


FIG. 1—SHOWING THE GENERAL PLAN AND APPEARANCE OF THE UPSETTING DIE

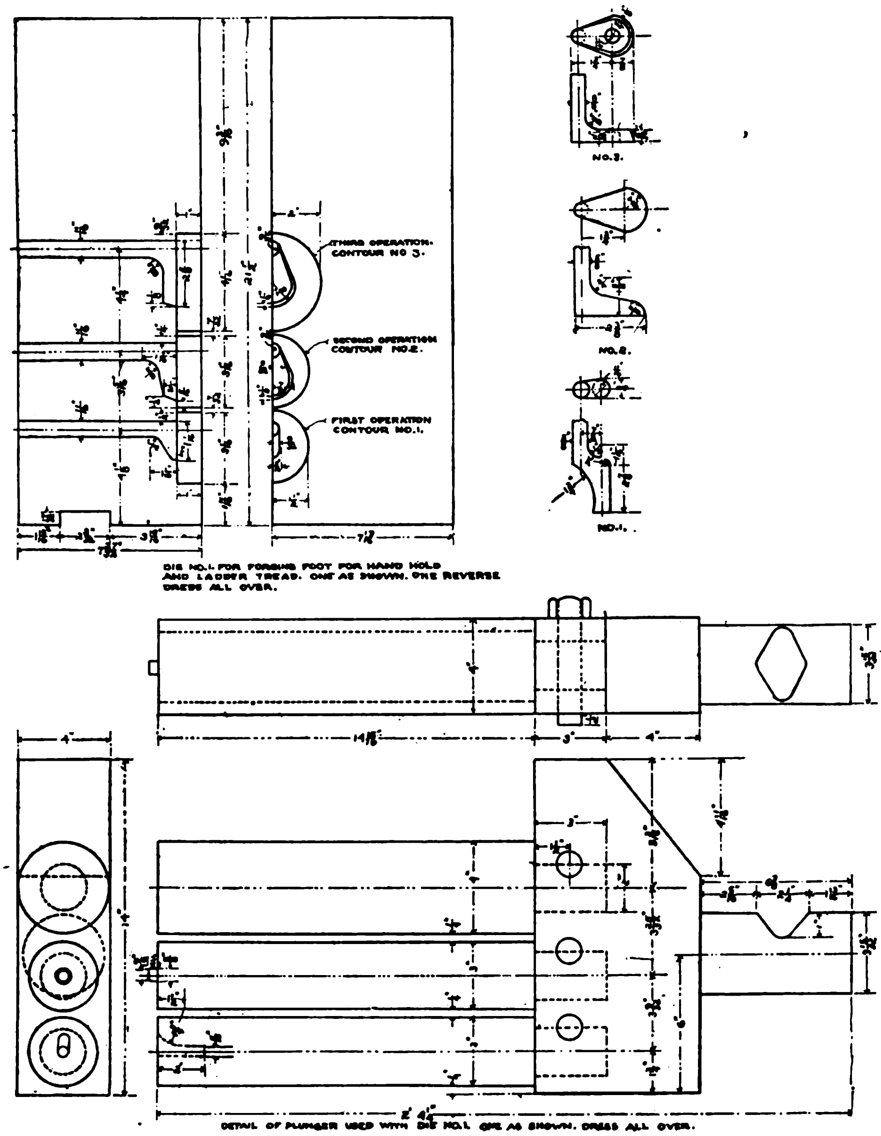


FIG. 2—SHOWING DETAILS AND DIMENSIONS OF THE UPSETTING DIE

and ready for use in the die prepared for that purpose.

Dies and Formers For the Railroad Smith Shop

G. M. Steward

After spending considerable time looking into this subject we are of the opinion that this is the day of the die and that, whether we will or not, all workers of metal must eventually resort to it in order to meet competition.

The writer with many others held the opinion in the past that the steam hammer was an indispensable tool, not giving much thought to the warning given us by our German friend when he predicted that the day would come when all shaping of metal would be done by pressure. Since we cannot fail to observe that the day referred to by our friend is fast drawing near, the thought foremost in our minds should be the die and the best method of its manufacture.

We note with satisfaction that much headway has been gained in the last few years in connection with this feature of our work, and each day brings its quota of improvements over former efforts. The writer has learned a great deal in connection with the manufacture of dies from the methods of the people who use the cold process.

We find that material will go so far at one operation without bending, and to secure good results should never be pressed beyond that point, as in the making of ladder treads, for which I present tracings showing

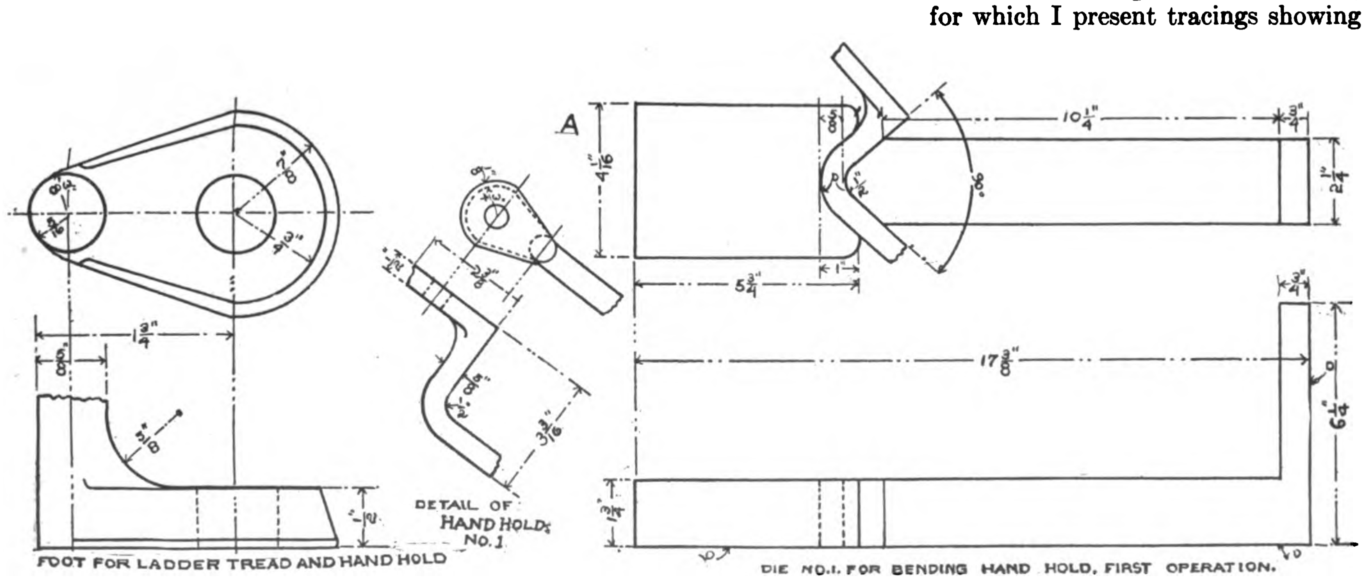


FIG. 3—SHOWS DIE FOR BENDING HAND HOLD AND ALSO DETAILS OF BENDS FOR LADDER TREADS AND HAND HOLDS

the various operations, five in number, necessary to complete these forgings. Four and one quarter inches of ⅝-inch round iron are required to make the foot for one of these treads, and three operations in our forging machine. Fig. 1 is a general plan of the upsetting die. Fig. 2 shows upsetting die in detail.

As you will note in Fig. 2, contour No. 1 shows the first upset, the material being pushed back just as far as it will go without bending. It is then given the second operation, at which it is pressed back to a solid forging as shown. You will note that it is now a trifle smaller in contour than the finishing die shows. It has now reached the third operation. The die now used is made the exact shape of the foot required, and the plunger has a pin in the center which penetrates the foot within $\frac{1}{16}$ inch of passing through $\frac{9}{16}$-inch stock, as shown in third operation. As you will observe we now have a perfect foot and an almost perfect hole in it. This completes the upsetting portion of the foot.

The stock is then taken to an emery wheel and ground, making a very neat forging. The stock is then taken to the air power bending machine and given the first bending operation. It is placed in die No. 1, Fig. 3, the foot resting at an angle of about 43 degrees, and the first bend is made as you will note at A, Fig. 3. The second bend is made in precisely the same manner, excepting that the 43 degrees is made at the opposite side from first bend. It is then placed in bending die No. 2, Fig. 4, where one revolution of the press completes a tread. All handholds are made with the same upsetting dies and are bent on bending die No. 1.

The upsetting dies used were forged by us from scrap steel, a set weighing when completed about 200 lbs. Very little machining is required. We have turned out more than 5,000 upsets on one set without dressing. The dies used for bending are made by us in the same manner and of the same material, weigh about 60 lbs. per set and require very little machining.

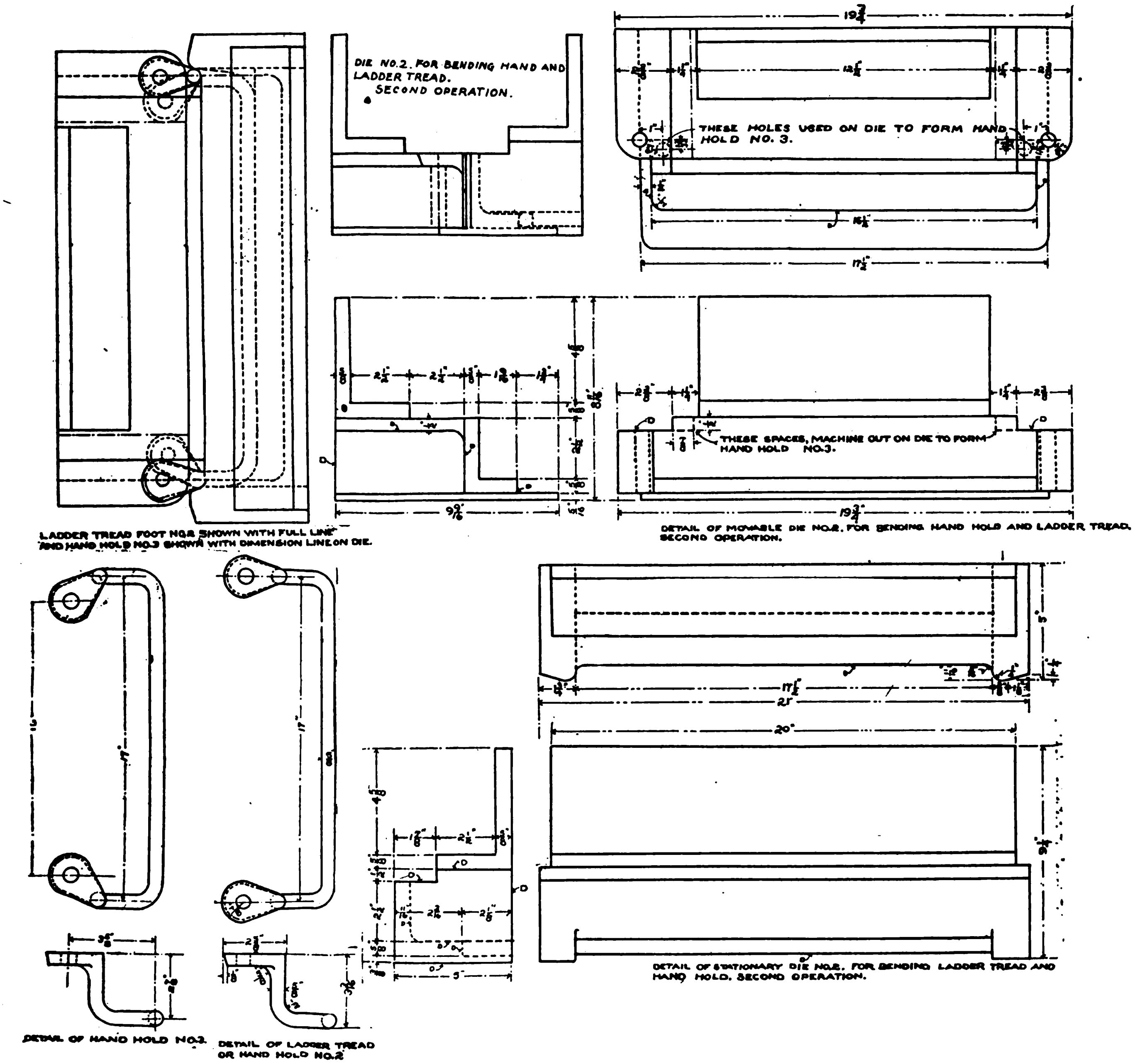


FIG. 4—DETAILS AND DIMENSIONS OF THE DIE WHICH COMPLETES THE HAND HOLD AND THE LADDER TREAD

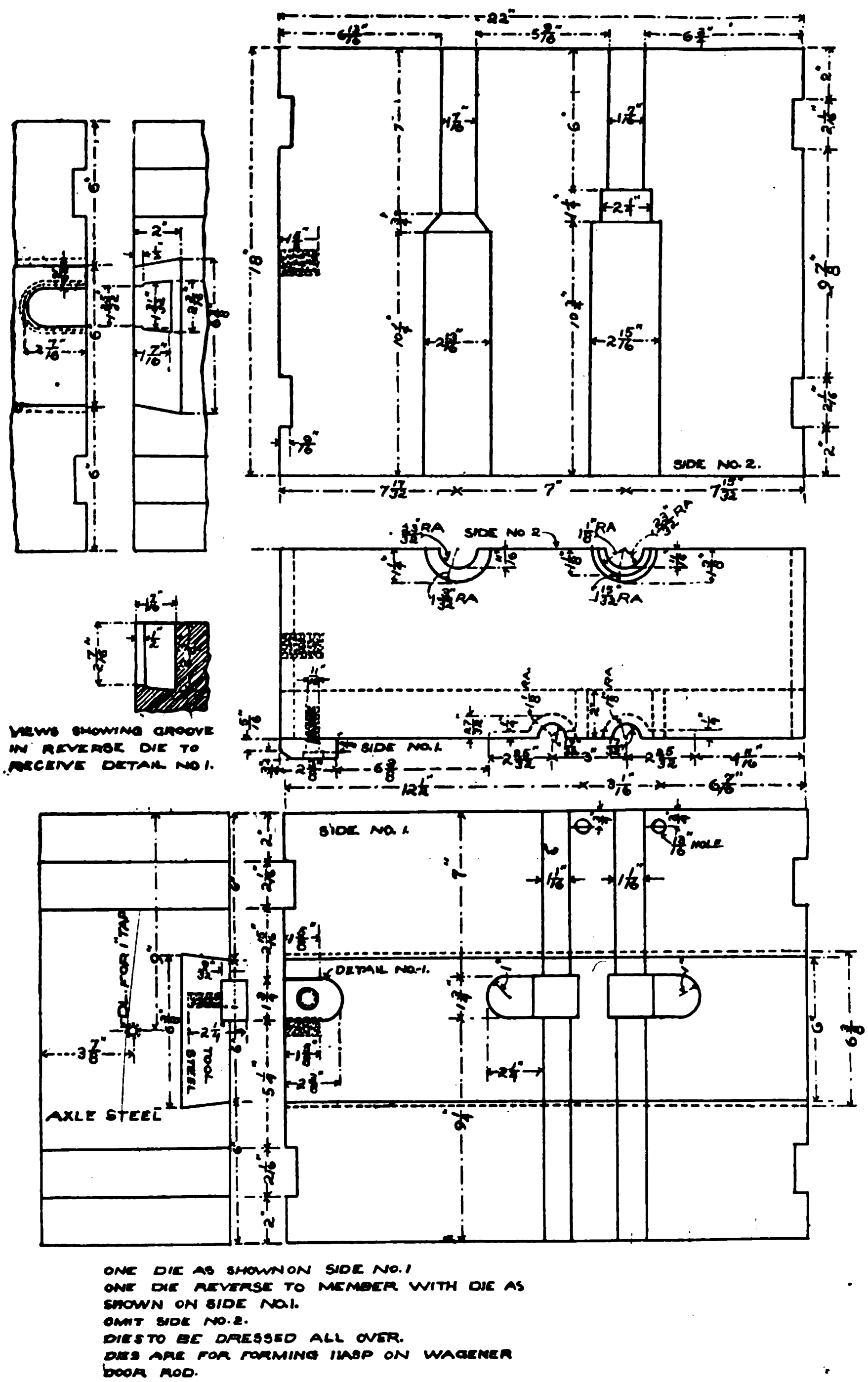


FIG. 5—A FORGING DIE FOR MAKING THE CENTER PARTS OF WAGNER DOOR RODS

Fig. 5 shows a die which we use in our forging machine for the making of the center portions of Wagner door rods. We first take ⅜ by 1½-inch iron, cut 7 inches long, and bend U-shape on our air power bending machines. The next operation is at a forging machine where the U-shaped parts are placed on 1-inch round bars which must be cut proper length. These pieces being placed 13¾ inches from ends of bars. These are now heated, placed in die and each movement of the forging machine completes a center.

It would be possible to continue on this line indefinitely, as the greater portion of the forgings in demand at this time are being made in much the same manner as those we have described.

Remarkable as the changes are that have already been brought about in the methods of working metal as applied to the smith shop, we might well say that the revolution has but begun, and we should feel reasonably proud that we as individuals as well as members of this association have been privileged to contribute to the advancement of a business which to many of us means a life's work, and which may, we hope, show still more noteworthy evidence of successful efforts at each succeeding convention.

Special Welding and Threading Steel for Railroad Equipment

V. S. Yarnall

As the efficiency of a railroad depends largely upon the condition of its motive power and rolling stock, so the mechanical men responsible for its equipment depend to a great extent for results upon the quality of the material supplied them for its maintenance.

The high rate of speed at which the modern railroads operate their heavy trains make it necessary to provide in every way against failure in service. This being the case, the selection of a suitable grade of material for vital parts of locomotives and cars is of utmost importance.

The application and manipulation of the welding and threading grades of steel that are now being used by many of the railroads throughout the country will be the subject matter of this paper.

The speaker's experience has been particularly with the Carnegie special welding and Carnegie special threading grades of steel, while engaged in introducing them to mechanical men of the different roads. Therefore, the following remarks will deal more or less intimately with these two special grades of material.

It has been the standard practice for some years to use high carbon steels for numerous parts of locomotives; such as axles, main and side rods, piston rods, motion work pins, etc. The change from other materials to steel came slowly, but it came, and shows the tendency of the mechanical engineers to give the preference to steel.

Low carbon steel, suitable for general forgings, is of a more recent development, which has put into

the hands of mechanical men a material that is showing a high standard of excellence, as well as a reduction in the cost of working and maintenance.

Grades of Material

It is always desirable to have as few grades of material to deal with as is convenient with the work in hand.

It would have been possible, when introducing special steel for railroad equipment, to have put on the market a steel that would weld, bend and forge as well as machine, but it was found that steel made to have a good welding quality was accomplished at the sacrifice of the machining and threading quality, and vice versa. Therefore, the conditions seemed to demand that two grades of material, instead of one, be available for this class of work.

The Carnegie special welding steel was designed to give the highest efficiency to parts that are to be welded, forged or merely bent, and is being very satisfactorily used for such parts as equalizer bars, arch bars, spring hangers, reverse shafts, mud rings, coupler pockets, brake connections,—in fact, is suitable for all classes of welded, forged or bent work.

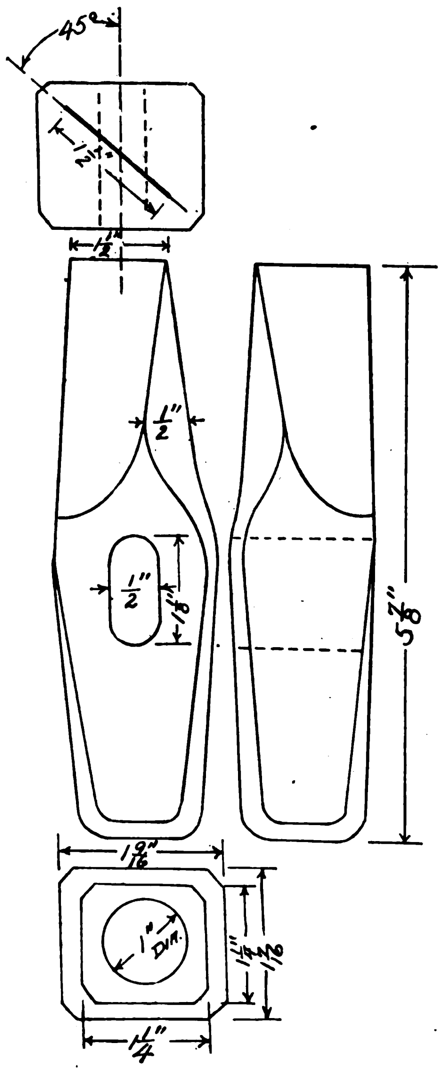
Carnegie threading steel was designed to have a free cutting quality, and is being successfully used for locomotive frame bolts, cylinder bolts and stud bolts, valve rod and transmission bar pins, special tapered and turned all over bolts, drill nuts, car bolts, etc., and is best suited for work that does not require welding, but may require forging and subsequent machining or threading.

Physical tests have shown that Carnegie special welding and threading steels possess an ultimate strength equal to the best grades of material now specified by the railroads for general forgings intended for locomotive and car parts, with a relative high elastic limit and ductility beyond that of ordinary soft steel, showing its fitness for this class of work.

Manipulation of Carnegie Special Welding Steel

Heating for welding or forging is one of the most important operations in the working of material. While this fact is known by all good mechanics, still, for various reasons, it is too often overlooked. Overheating, or the application of heat too rapidly on parts that do not receive subsequent work or forging, frequently occurs, especially in shops where the operator is working on the piece-work plan, resulting in the material being left in a weakened, brittle state, be it either iron or steel that has been so treated or, more properly, mistreated. Therefore, to obtain good results in the finished part it is necessary to use at least ordinary care in heating.

The welding of Carnegie special welding steel is as simple as welding



DETAILS OF A SPECIAL CHISEL BY SAMUEL ROHRBACK

The blade is set at an angle of 45° and can be made either right or left hand. This style is excellent for tool dressing and for long cuts.

refined iron and requires as much care—*No more! No less!* Excellent results can be obtained with or without the use of flux, depending on the character of the work. Sand as flux is very effective.

Forging:—The welding grade of steel offers many advantages for this class of work; being very ductile it can readily be formed into the desired shape at any workable temperature, either in a forging machine or under the hammer, without injury to the metal. On account of its homogeneity, parts that are made of it will practically be of equal strength, both longitudinally or transversely.

Bending:—There is possibly no operation in the manufacture of railroad equipment that at times is the cause of so much annoyance and actual loss as material that will not bend without fracturing more or less at the point at which it has been bent. This, indeed, often occurs after much work has been done on the part. This trouble has, no doubt, been experienced by most of the gentlemen present, at various times, and is the usual result obtained when working red or hot short material.

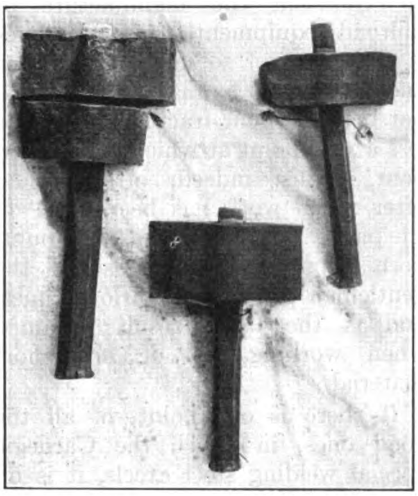
If there is one point, of all the good ones, in which the Carnegie special welding steel excels, it is on account of its freedom from red, hot or cold shortness, and that it can be bent cold or at any workable temperature without the least sign of a fracture. This property alone is responsible for the saving of many thousands of dollars yearly in the shop costs of the railroads now using this grade of steel.

Tests of 6-inch flats, bent hot and cold at 180° flat; also test of 4-inch flat, bent hot at 180° on edge, without any sign of a fracture.

Recovering or Refining the Grain:—There are forgings made at times which, from the nature of the design or for other reasons, make it impossible to heat for welding without heating beyond the portions that will eventually receive work when being welded. This particular overheated, unworked portion will in this manner be left in a coarse, granular state. It is often essential that the finished forging be in the best possible condition throughout. Where Carnegie special welding steel is used, such parts can be recovered or refined by reheating to the recalescent point, which is about 1,500° F., and allowed to cool in the air. The overheated portion will then be found to be fine in grain and in good condition. This treatment will benefit any grade of commercial forging steel that has been overheated,—of course, providing it has been only slightly overheated and not badly burned.

Manipulation of Carnegie Threading Steel

Heating:—As the name indicates, this grade of material has a free threading and machining quality, and while it can be used for parts that require both to be welded and subsequently turned or threaded more care must be exercised in heating for welding than is necessary when using the welding grade of steel.



SOME GOOD CHISELS AND THE WORK THEY DID

Hot Working:—This grade of steel will flow very readily into the various forms usually made on a forging machine, at an orange to bright orange heat, without injury to the metal.

Machining Quality:—The threading grade of material is being used for all classes of turned all over locomotive bolts and car bolts, etc., and machines very freely either in a turret lathe or a Lassiter engine bolt machine, and will thread on any of the prevailing types of bolt cutters, although the best and smoothest threads are obtained when cutting any grade of steel by grinding the chasers to have a slight rake or hook to the cutting edge, similar to the shape of an ordinary lathe turning tool.

Casehardening:—For all parts requiring hardened surfaces, such as motion work pins, the usual method of casehardening by immersing the hot part in cyanide of potassium or packing in bone and subjecting to heat has been found to be very efficient when applied to the Carnegie special threading steel. Tests of casehardened parts made of this grade of steel have shown the center or core to be tough, and the outer case to be very hard.

Co-operation:—It has been found to be eminently satisfactory, both to the users and the manufacturers of steel, to consult each other's interests, by having the representative of the manufacturer visit the railroad shops and confer with the mechanical men relative to their requirements, and co-operate fully with them in arriving at grades of material to suit their needs.

It was in this manner that the two grades of steel that have been the subject matter of this paper were designed, exploited and developed.

Only by constant intercourse with the mechanical men was it possible for the manufacturer to follow the working of this material through the railroad shops and know definitely whether it was affording satisfaction in every particular or not.

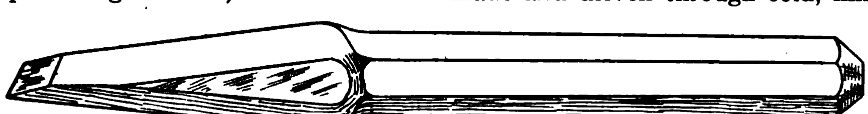
Sections of Material Available:—Both grades of material are now obtainable,—all sizes of blooms, flats, rounds, squares and hexagon bars.

How to Forge Cold Chisels

Bert Hillyer

In all shops, large and small, the cold chisel plays an important part. Some smiths are skilled in making this little tool and turn out a nicely tapered, thin, keen-cutting chisel that will do a large amount of work with little labor. Others turn out a stubby tool, left that way to make it stand, and it necessitates an expenditure of an extra amount of muscle to do the work. For the benefit of the unexperienced ones the writer will explain what he has found to be the best way. There is no use of my saying "take a piece of good steel," as I am well aware that most smiths have to take what they have and make the best they can of it. But I do say that a poor piece of steel properly forged and tempered will be better than a good piece improperly forged and tempered. The forging heat differs according to the carbon in the steel, the same as in hardening. The higher the carbon the lower the heat, but the first heat should be high enough to work freely. If a power hammer is used, the heat can be lower than when drawn out with sledge, as the force of the blow of a power hammer is harder and it draws the steel evenly through the center, which is important. With sledges it has to be heated to a higher temperature to do this same thing. The first drawing should be done square, tapering all the way to the point. Then pound on the top and bottom sides evenly, as much on one as on the other, turning the chisel with every blow. If the chisel gets crooked do not turn it on its edge to hammer it straight, but keep it flat and hammer on the inside of the curve. This will make it straight again. The next heat should be lower, closing the grain in with lighter, even blows, stopping when the stock gets dull red. Do not wait until it is black. Some smiths claim it should be packed at a real low red just before it gets black. I think it safer to pack it just below the refining heat, as it surely has to be raised to that heat to be hardened and there is less risk, of breaking the molecules apart than there is if hammered a little too cold. The chisel is then heated to a low red and allowed to cool off and then ground. The bevel of the cutting edge should be ground even and the end slightly rounded. The chisel is then hardened at the lowest heat at which it will harden. This is best found out by taking a small piece from the bar, drawing it down thin and hardening at different times from a low red to a full red, breaking off the end each time and examining the grain. The heat that leaves the grain finest and closest is the desired heat.

The chisels in the engraving were made and driven through cold, mild steel by my son—a seventeen-year apprentice boy—after following my instructions as above. The chisels were very thin and the edge was not turned or dulled the slightest bit. The smallest chisel is ⅜-inch octagon steel of medium grade and was driven through a piece of 1-inch



HOW TO SHAPE THE OLD FASHIONED DIAMOND POINTED TOOL

square mild steel. The next was a medium grade of ½-inch octagon steel through 1½-inch mild steel. The largest one is ⅝-inch octagon and one of the cheapest steels on the market. It was worked and tempered properly and proved itself by going through two pieces of mild steel, one 1⅜-inch and the other 1¼-inch mild steel. A twelve-pound sledge with a husky helper swinging it was used in driving chisels through. These chisels were not driven through for show, but were done as a part of the lessons teaching the boy how to work steel.

While writing on chisels I must say that the old-fashioned diamond point was about as homely as it could be, it being a piece of steel drawn down square, tapering at the end and then cut at an angle. A neat and attractive one can be made by drawing down the same as the old way and then flattening the corner on top and bottom as in the engraving.

Boat Forgings and Ship-Smithing

DAYTON O. SHAW

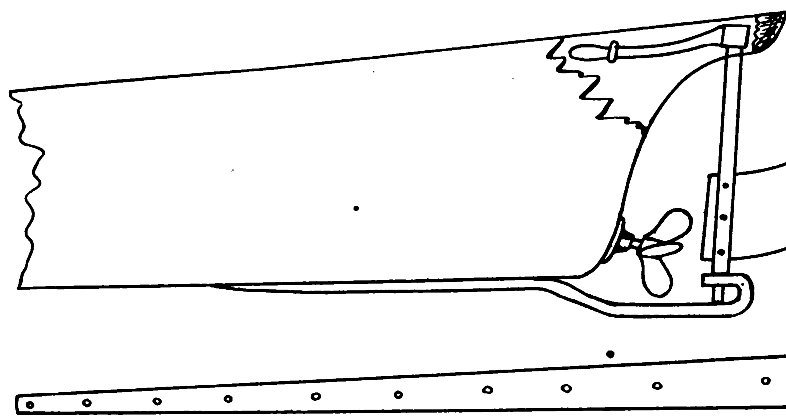
How a Keel is Reshod.

Power boats are fast taking the place of the sailing craft, but for real, genuine pleasure give me a sail-boat with a stiff breeze and a flowing sheet. Nevertheless, the power boat has come to stay. We have one now that has to be shod. It is 16 feet long.

To shoe the boat let us commence at the stern. Take a bar of good iron, 7 feet long by 2 by ⅜-inch. Draw one end down to ⅛-inch, keeping the width of the bar. Round the other end and turn 2 inches over a ⅝-inch piece of flat iron.. A ¾-inch hole is drilled in the top piece to receive the rudder post. The offset should be deep enough to clear the propeller and also have a good slant to glide over rocks or other obstacles. Now drill and countersink for $\frac{5}{16}$-inch bolts; make bolts to fit the countersink and sharpen the bolt ends. Drive them so as to cut the grain in the wood. Now take a piece 2 by ⅛ inch and long enough to cover the rest of the keel. Narrow one end down and weld ⅞-inch half round iron to run up the bow end. The nails for this piece should be ¼-inch wire. For the rudder post take ⅞-inch half round, double over and weld 4 inches of one end. Now swage down 1 inch of end to ¾-inch to fit the hole in the shoe. Have the end rest on the bottom of the shoe with the shoulder on top. Now measure width of your rudder and weld all of rudder post except space for rudder. Square the upper end of the rudder post, tapering square part toward the end. The rudder should be $\frac{3}{32}$-inch thick, and should be slipped through slot in post for two inches. Then drill and rivet.

Next comes the tiller. If a straight one is wanted take 1½ by ½ inch, double the end over 1½ inch twice and weld. The hole should be punched the same size as the square on the rudder post and no larger. Cut the bar off 9 inches long and taper to 1 inch from end. The end is rounded and punched for 1¼-inch hole. Now the head is drilled and tapped for ⅝-inch set screw and the rudder post drilled for cotter pin under the top part of the shoe. To fit the tiller head heat up red and drive on end of the rudder post and plunge into the bath. The end being a little tapering it will drive off all right and you have a good fit.

(To be continued)



THE STERN FITTINGS OF A POWER BOAT SHOWING ALSO THE SHOE

My Experiences As an Apprentice

OLD APPRENTICE

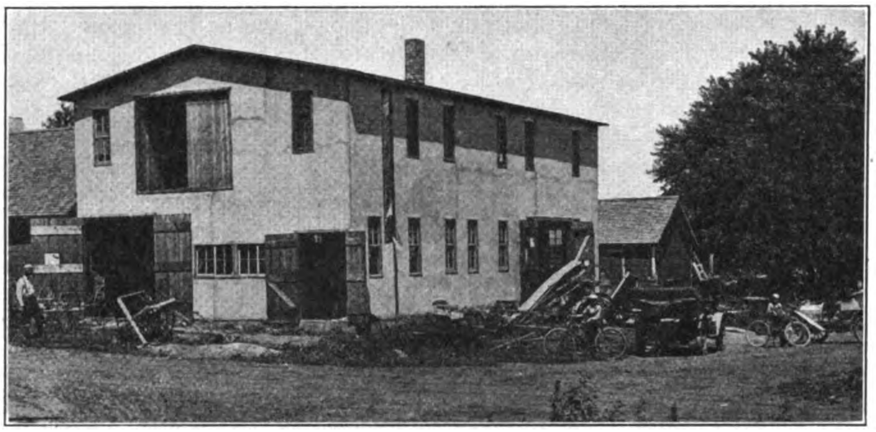
I started to learn my trade with a man who I thought at the time would be a first-class smith to work for, as he was a good mechanic and seemed to be a good-natured fellow. I started on the first day of October, 1904, and the first job given me was, of course, clean up the shop and feed and water a team of horses, a cow, two pigs and keep the stable clean. That was all right until I became pretty handy in the shop. Then when I started in floor work it was my lot to have my nose turned to the floor from early morning until late at night, then do chores and have tea about nine o'clock. All the boss did was to milk the cow, and that because I refused to do so.

I worked for him for four years, never having one single noon hour entirely to myself in the four years, let alone a half day to play baseball, as Brother Morrison gave his apprentice. But I was determined to finish right, and I am now glad that I remained. I was taught to do a job to the best of my ability, and I have never been sorry for trying to do my best at any kind of work that was put in my charge.

I wish to say this: Do not hire a boy to learn the trade and then put him at hoeing, doing chores, washing buggies, mixing concrete and raising buildings and all such trash. If you hire him to learn the trade teach him blacksmithing.

Is there a single blacksmith who hires a boy to learn the trade simply for the sake of teaching that boy? I say no. He takes the boy to teach for the benefit of himself (the smith), and when the boy is advanced enough to be handy, then is the time the smith gets his money's worth. I have been on the floor for one hundred shoes a day for a week, did the chores, kept the shop tidy and got only $4.00 a week. Can you blame the boys for working at other occupations?

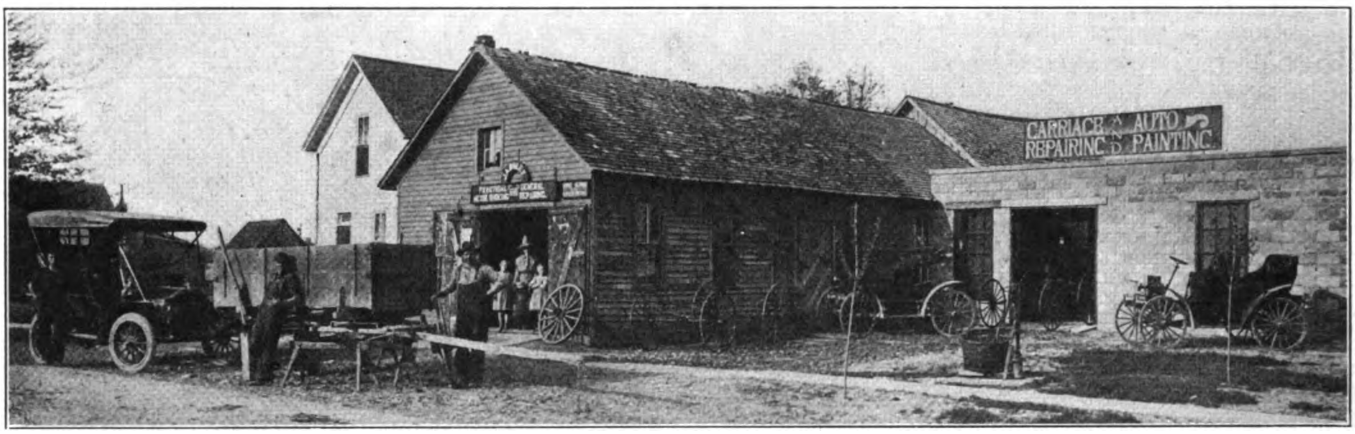
We never had a horse in his shop upon which I could not nail the shoes if the boss could fit them to the animal's feet, and we turned only one horse away in four years that we could not shoe. The horse crippled me by kicking me, and the owner claimed that the horse was quiet. As soon as I went near him he kicked me. We found out that he had been



MR. M. E. VANDERVEEAR'S NEW OHIO SHOP WHERE HE DOES GENERAL REPAIRING AND WAGON WORK

sent out of several shops. We used no stocks and never put on a shoe while he had a rope on.

When you hire an apprentice do as you agree. Work him ten hours, but give him Sunday to himself instead of doing chores. Do not discourage him. Cheer him up a little, and do not use him like a dog. Let him eat with you and do not give him an old, tumbled-down forge with an old duck's nest tuyere, a bellows that you could throw a cat through and an old hammer that looks like the anvil. Fit him up with decent tools and set him going right. Use him as you would have others use you; then he will never forget you and you can face him in after years, and if he is a man at all he will thank you for it. Use him white, but if he is no good discard him decently and engage one that is right.



THIS INDIANA SHOP IS RUN BY MR. J. A. BAILEY. HE ALSO HELPS TO KEEP THE AUTOMOBILES IN WORKING ORDER

An Indiana Power Shop

J. A. Bailey

The accompanying engraving will give you some idea of my shop. I do all kinds of work—general smithing, repairing, painting, rubber tiring, machine work and automobile work. I have a five-horsepower gasoline engine, a 7 by 29 lathe, a disc sharpener, an emery wheel, a spoke tenoner, a band saw, a rip saw, a jointer and a felloe rounder. I also have all the necessary small tools, and employ one man beside myself. The two automobile buggies in the picture are products of my shop.

Power in the shop pays. I get good prices, but still not enough. A smith ought to be able to retire at fifty, because he is generally broken down at that age. Most smiths, however, are compelled to work as long as they live. I get $1.50 for four new shoes up to No. 6, and $1.75 for No. 6 and No. 7.

A Few Hints On Installing a Gasoline Engine

Consider well the location of your gasoline engine. Don't stick it in some corner "out of the way". It is a valuable and important machine and, being in constant use, will require the best attention you can give it.

It should be placed where it can be easily cared for, accessible from all sides, in a good light and conveniently located with reference to the various machines to be operated.

Too often the user fears to sacrifice floor space, but it should be remembered that the power plant

THE NEAT OHIO SHOP WHERE MR. GEORGE KOCH DOES GENERAL WORK AND SHOEING

is responsible for the successful operation of all the machines which it drives and, therefore, the space which it occupies could hardly be employed to better advantage.

Having selected the location, the next thing is to provide a foundation. It is a big mistake to attempt to run the engine on a shaky floor or without a perfectly solid and steady foundation. Concrete, of course, is the best for this purpose. It can be put in easily and at small cost. Dig down far enough for a good base. Then build a form the shape of the engine base at the top, and considerably larger at the bottom, giving a decided taper. The form should be high enough so that when set in the excavation you have made, the top will be even with the floor level. Set the form up carefully and then pour it full of concrete. The proper mixture can be easily ascertained.

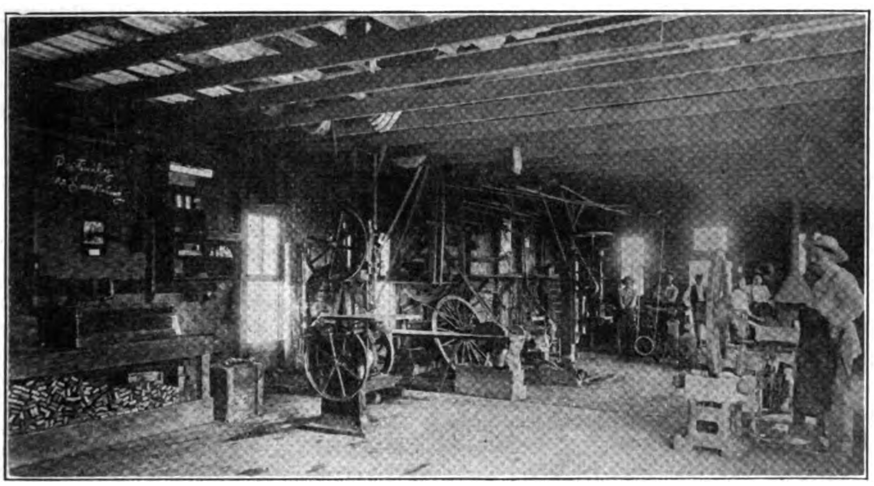
Before pouring is finished, bolts or irons should be set in the concrete. To these bolts the engine may be fastened.

After it is well set, the forms may be knocked out, the necessary filling done and the floor laid. It is well to give it ample time to harden, however, before setting the engine, especially if the weather is damp.

While the engine may be run temporarily without a foundation of this character it will be found that the strongest floor will be hardly firm enough for continued use. If it is absolutely necessary to set the engine on a floor, however, it may be stiffened and strengthened greatly by driving pieces of 2 by 4 down into the ground beside the stringers until their tops are level with the floor, then nailing them firmly to the stringers directly. This will help surprisingly, but is hardly suitable for a permanent foundation.

Having the engine fully installed, you will begin to run your shafting and pulleys. Care should be taken to figure the pulley sizes correctly for the speeds desired and to accurately line them up. Use good belt, amply heavy for the power to be carried. In all that you do take pains and plenty of time. A hurry-up job generally wastes much more time than a slow one. Care is always well repaid. While a gasoline engine is simple, it needs some attention and it will not give good service unless intelligently handled.

Avoid all the mistakes possible by learning your engine and its operation, but, if mistakes are made, let them teach you something. Don't make the same mistake twice. Begin right—with the installation of the engine—and all of the time give it care and attention—not neglecting the little things.

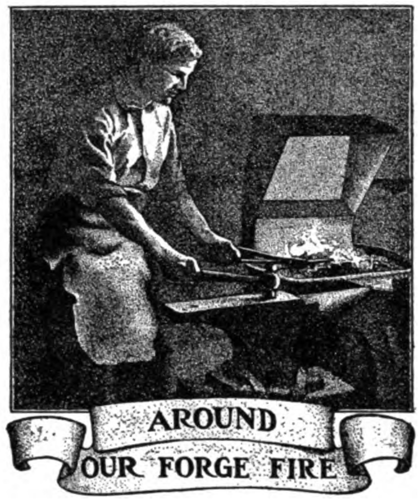


MR. MILO BROWN'S SHOP OF TEXAS IS WELL EQUIPPED WITH POWER MACHINES AND TOOLS

How to Cover a Dash Perfectly

J. F. McCoy

Lay the dash iron on the leather, make a hole with an awl ⅛ of an inch from the bar at each corner on the outside. Then make holes $\frac{3}{16}$ of an inch from the bar in each corner on the inside. Take the frame away and draw a line with a marker or a sharp piece of pumice from awl hole to awl hole, allowing ⅜ to ½ inch all around on the outside to cut by. Cut on this line. Now cut the next piece the same size and give one of the pieces a light coat of paste on the flesh side. Lay the two flesh sides together and rub out perfectly smooth; allow it to lie between two smooth boards for about three hours or until the paste is nearly dry. Then take the thread out of your sewing machine needle and perforate the marks all around, inside and out. Then pull the two pieces of leather apart, put your frame in as it was marked and fasten at each corner on the outside with a needle and thread. Then sew with two needles all around on the outside first, then finish on the inside, and you have a perfect dash without a wrinkle or draw.



"Anything new in that book of yours?" asked the Editor, as Benton settled into his favorite chair.

"Yes, I've got hold of a recipe that will probably surprise the majority of your readers," and Benton took up his recipe book and, after a short search, he read the following: "To caseharden cast iron make a powder by thoroughly mixing equal parts by weight of saltpeter, prussiate of potash and sal-ammoniac. A dipping bath is made by mixing one ounce of prussiate of potash and one half ounce of sal-ammoniac to each quart of water used. In use, heat your cast-iron stock to a good red, roll in the powder and then dip in the bath. That seems a simple enough procedure" said Benton, closing his book, "and a chap down near Pittsburgh tells me that he has used it with fine results."

"Well, Benton, I'm glad to get that hint," returned the Editor. "A man out in Missouri wrote in some time ago, asking if we could help him with a formula of that kind. Your hint is just what that fellow is looking for. Now, what have you in the line of belt cements?"

"Why, there are lots of belt cements," replied Benton, reaching for his book. "I don't believe I've ever been out hunting recipes when I didn't find two or three recipes for making belt cement. I enter only an occasional one in the book now and got hold of a good one just the other day. Ah, here it is: 'Take one pound of the best white glue and prepare in the regular way. Then add an ounce of powdered white lead and mix thoroughly. When used, thin with alcohol and apply it hot to thoroughly cleaned belt ends'. That cement is easily prepared and is said to be excellent for joining belts."

Trompin' Fever

W. O. B.

Y' know what I would like t' do
Along 'bout now when summer's thru?
About this time o' year I feel
The trompin' fever kind o' steal
Down through my bones—an' I would like
To tromp an' tromp from morn 'till nite.

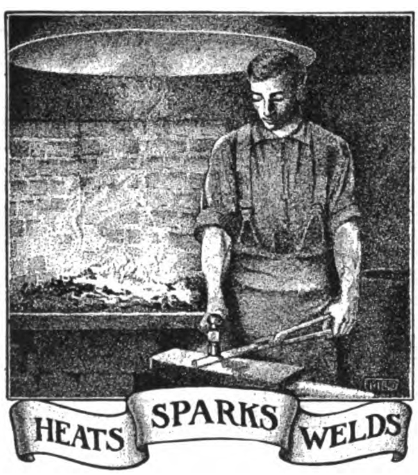
I'd like t' tromp through Deemer's wood—
I know 'twould do me lots o' good—
An' out through Millse's section, whare
Joe an' me once caught a hare
With a broken leg—it couldn't run—
Been shot by sum fool hunter's gun.

I'd like, jes' arter a fall o' rain,
T' pull on boots an' tromp the lane—
T' slosh right thru both puddle an' pond
An' over the hill an' then beyond
Whare we once built a house o' bark
T' cover the nest o' a meadow lark.

I'd like t' tromp on up the road,
Aroun' the mill t' Hoppin' Toad—
A place we named es such y' see,
Because thet's all thet seemed t' be
In thet thar nayborhood—jes' toads
Is all thar was—jes' loads an' loads.

I'd like t' tromp down thru' the glen,
An' see the little falls agen,
Where someone else an' me once sat
An' had the finest kind o' chat,
Beside a pool o' funny fish
Thet folks sed would grant eny wish.

Thet's jes' what I would like t' do,
Along 'bout now when summer's thru—
Jes' tromp an' tromp thru' wood an' glen,
An' see agen spots I knew when
The world was jes' a place o' joy
An' nature for a country boy.



Short credits make a fat purse.

Even the tramp is ambitious—to live without work.

One satisfied customer is better than ten who must be pacified.

You can't quench fire with gasoline—nor can you drown troubles in drink.

"Keep a-hammerin'" at collections, too. Easy lies the head that has no debtors.

The importance of some men is surpassed only by their own ideas of their importance.

Price appeals to the purse, but it cannot bring a re-order without quality as a partner.

'Tis not well to exceed the speed limit on either the road to success or the road to ruin.

The customer that brags the loudest isn't always the one with the largest bank account.

The smith who drops his prices when his competitors drop theirs will soon drop out of business.

It's a bad day when a smith tries to sell bum work at a bum price—it's a bum day for the bum smith.

The smith who takes a job at a cut price "just to keep busy" is paying a big price "just to keep busy."

Cultivate the acquaintance of the man who cultivates the soil and help him cultivate by selling him cultivators.

They're free—they're pink and they're plentiful. So don't forget to ask for more Buffalo Stamps when you want them.

They say it's "never too late to mend." But how about the holes in the shop roof? Better consider no time too early to mend.

The man who takes luck as his guiding star never found it leading him to success in the smithing business—or in any other business.

It's far easier to keep a horse in good condition than to strengthen him after he has lost his health—and the same applies to business.

Some men think they're real, live hustlers when, like our friend Tom Tardy, they just fuss around, too busy to do anything, yet accomplishing nothing.

Shorten up on expenses and losses—you'll fatten profits without padding selling prices. But when costs advance don't hesitate to move prices up accordingly.

Are you figuring on the profit you get? Are you getting the profit you figure? Better know for sure before the sheriff tacks a notice on your door.

Fooling the people on price arguments is like sneaking an unstamped letter into the mail box after the carrier has gone by—it'll be found out on the next trip.

Don't hold your order too long; you may be disappointed. We don't want any of "Our Folks" to say they didn't have a chance to buy some of those fine 1912 calendars.

When the horses seem to tremble at the sound of your voice don't glory in it. Change the voice—a kind tone is more human and will accomplish more at less expense to good horseflesh.

When a man comes to you with a new scheme to produce business, listen—for he may be the one in ninety-nine able to deliver the goods—but, incidentally, keep your hand on your wallet.

Right now is a good time to present bills to your farmer customers. They've got money now and may not have if you wait. Push collections hard and get some of those old accounts cleared up.

Attend to your side lines, but see that you have time for the main lines, too. Don't let good customers find all hands grinding feed or making cider when a horse is to be shod or an axle to be welded.

Don't allow the scrap to accumulate to such an extent as to be in the way. Pick out the stuff of value, but throw out the worthless matter. The scrap pile is the smith shop indicator. What does yours indicate?

How about that job of whitewashing? Right now, just before closed shop doors and windows darken the shop, is a good time to whiten the walls. The change from black to white walls will surprise you and make work easier.

Uncle Billy Martin says: "I'd a good site rather trust thet man who never saw the inside o' the church but who allus walks his horses uphill, than the chap who reads The Book all week and trots his horse all the way uphill on a hot day."

There's danger in both extremes—don't be so dissatisfied with your location, business or profits that you want to move every little while—nor be so satisfied with conditions that you fall into a rut. Best be displeased just enough to give you incentive to better conditions.

Years of experience may mean very little. There's our friend Tardy, for instance; Tom's had some twenty or more years of smithing experience and still has a great lot to learn. In fact, it's not likely that three times the ordinary lifetime would be sufficient to teach Tom the trade. Breadth of experience counts most and Tom's experience has been about as wide as a mountain trail.

Do you realize that the modern smith needs to know more and more every day to keep up with the procession of progress? Look back twenty years for example. In comparison with today the smith required to know little beside how to work his bellows and pound iron. Today, there are more brands of steel than a smith can count on fingers and toes and as many ways of working them, to say nothing of the modern appliances and methods that are continually coming into use.

Volume Eleven begins with this issue. This number marks the passing of ten years of craft helpfulness, ten years of progress, ten years of continuous effort to boost the smithing business. That a great deal of the progress in the craft is due to the efforts of THE AMERICAN BLACKSMITH goes without saying, for such vigorous work as has been done by "Our Journal" could not but affect the craft favorably. One has only to compare the average smith shop of today with that of ten years ago to fully realize the advancement that has taken place. Let us one and all hope and work that the next ten years will see even more progress and advancement.

The right kind of man is willing to learn from a ten-year-old boy, if the boy knows something that the man does not. But then, it's more the knowledge than the source of knowledge that we care about. And when it comes to volume of knowledge, did you ever realize how little the average man knows? The average man could fill a good-sized book with what he thinks he knows—but a book has never yet been made large enough to contain all he doesn't know and never will know. Take just one small branch of human endeavor—your own trade of blacksmithing, for instance—how much we all of us think we know about it and what volumes and volumes could be written about what we do not know and never will know about it. Just ask the chap who knows it all if he can produce the fragrance of a rose or the colors of a sunset.

Another New Feature!

Money Refunded if Subscription is Curtailed

The refund feature of our long-time rates is a new departure. It protects you and insures you against loss. No matter how you view it, no matter what side you look at, this new feature is in every way of decided advantage to the subscriber.

To explain this new refund feature let us cite an example: Jack Smith sends in three dollars for a five years' subscription. At the end of two years he dies. Upon advice of his death we send a refund of $1.40 to his widow or heir. This $1.40 is the difference between the rate for five years and the rate for the actual number of years for which he received the paper. The result is that, instead of paying two dollars for two years' subscription, Mr. Smith received the paper two years for $1.60, with the possibility of getting five years for three dollars.

This refund feature will apply to all long-time rates and will enable "Our Folks" to take advantage of our best rates and yet run no risk of loss.

	U. S. and Mexico	Canada	Other Countries.
Two years	$1.60	$2.40	10 shillings.
Three years	2.00	3.40	14 shillings.
Four years	2.50	4.35	18 shillings.
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Ten Questions for the Month

The questions for last month were on forging—this month's questions are on horseshoeing. If you find you cannot answer some of these questions you may be sure that you are wanting in some branches of the subject.

We have no way of knowing how you like this question-and-answer feature unless you write and tell us about it. Won't you make it a point to say if you like it or not? Perhaps you can make a suggestion or two to make this feature of still more interest. If you don't like this new feature your letter telling us so will be just as welcome. What we want is your honest opinion. We don't care a cent for flattery unless it's honestly meant.

The questions this month are on horseshoeing. The answers will appear next month.

1. How does a knowledge of the anatomy of the horse's foot help the shoer?
2. What organ secretes the wall of the foot?
3. What is the primary object of shoeing a horse?
4. What is the purpose of the frog?
5. Should the frog ever be pared?
6. What causes corns on horses' feet?
7. Why is it bad practice to rasp the wall of the foot?
8. How would you shoe to prevent "forging?"
9. Name the bones of the foot from toe to knee.
10. What is meant by "toe-crack" and what causes it?

We suggest that you write your answers to these questions and then hold them for comparison with the correct answers which will appear next month.

Answers to Questions in September Issue

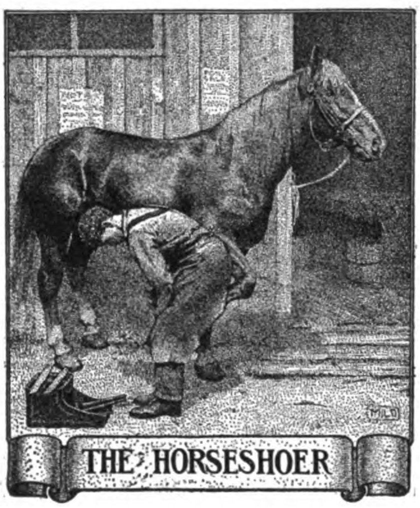
1. Steel should be heated in a clean, well-coked fire—it should be heated uniformly and evenly; not too fast or too slow.
2. The metal or stock comes to a welding or forging heat on the outside before the interior is yet at a proper heat. If heated too slowly or allowed to "soak" in the fire the metal loses its life and becomes somewhat similar to the condition as if burned.
3. The metal becomes brittle and is unfitted for use.
4. To prevent the formation of oxide or scale and to melt it when it does form. Borax, sand and potter's clay.
5. They have a tendency to force the water stock over the interior metal in any piece.
6. To prevent the formation of a hollow or pocket where the scale or oxide and dirt may lodge to prevent a perfect weld.

7. Reheat carefully to the refining heat and quench. That will restore the steel as much as it is possible to restore it.

8. Tool steel is a combination of iron and carbon.

9. It hardens it. It anneals or softens it.

10. The broken end of a bar of wrought iron presents a stringy, fibrous appearance, while machine steel shows a more crystalline, grainy fracture. Machine steel is stronger than wrought iron. They may be alike chemically, that is, the amount of carbon, etc., may be the same in each. They may also harden or refuse to harden in like measure.



Shoeing the Horse Correctly—4

J. C. Weaver

The Shoe

The horseshoe as a support and protection to the foot is by no means ideal. It is, however, indispensable for horses working on pavements and hard roads, and it is, therefore, the duty of the farrier to make and attach such shoes as will most nearly meet the ideal as a support and protection.

The form or shape of a shoe should always be as nearly the form or shape of the foot as possible, except when the foot is out of normal shape or is diseased and, inasmuch as front and hind feet and right and left are distinguishable, the same should be observed in the shoe. Some shoers, however, say that no difference need be observed for rights and lefts in horseshoes, but as long as a difference in feet is discernible, so, also, is a difference in shoes necessary.

As to weight and thickness of the shoe, these should be such as to make the shoe wear about four weeks, though every fraction of weight taken off the feet is a saving in the strength and endurance of the horse. But should the shoe be of such lightness and form as to wear rapidly, necessitating its removal in a short time, it becomes a question if it is best to remove the shoe very frequently or to make the shoe heavier, thus insuring its wearing at least three or four weeks. The frequent removal and repeated nailing on of the shoe must necessarily result in breaking the edge of the hoof, which is not at all to be desired. It is not always necessary to increase the weight of the shoe to improve its wearing qualities. It is more especially a question of the distribution of the metal in the shoe than increased weight. It is, therefore, up to the shoer to study, not alone the making of the shoe and its nailing, but how to distribute the iron in the shoe to give best results as to wear and still keep the shoe as light as possible. Then, also, the use of heavy shoes necessitates the use of heavy or large nails, and this is not desirous.

The use of heavy shoes also tires the horse unduly, and a tired horse will wear his shoes more quickly than a fresh horse. In fullering the shoe it is for this reason of advantage to make the groove or crease long. The crease or fuller also tends to roughen the ground surface of the shoe and thus prevent slipping on hard ground. The shoes illustrated are creased extra long, so as to make them as light as possible, yet not materially decreasing their wear.

Then, some animals wear their shoes more in one part than in another. When this is the case a slight change

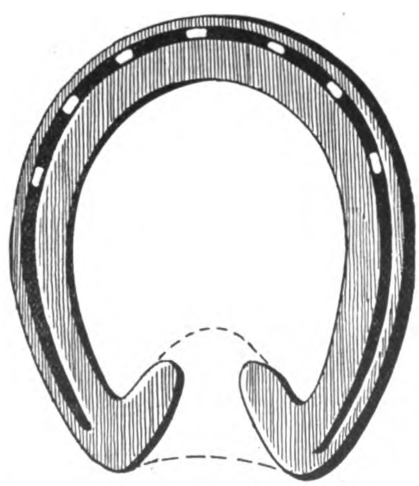


FIG. 1—SHOWING A DOUBLE HALF-BAR SHOE

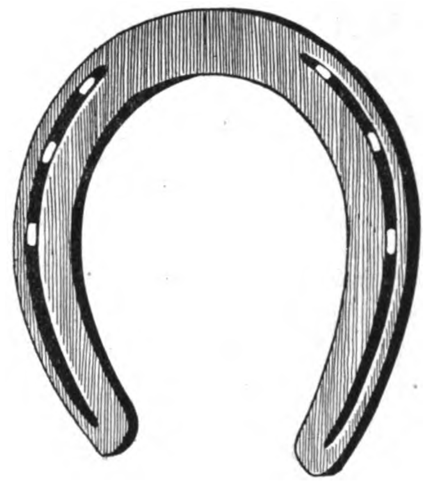


FIG. 2—THE CREASE IS MADE LONG TO LIGHTEN THE SHOE

in the distribution of the iron in the shoe will many times increase the wearing qualities of the shoe.

Of course, it is understood that some horseowners allow their animals to go altogether too long between shoeings, and in such cases it would be better for the animal if the shoer shortened the wearing qualities of the shoes. In the cities and on hard pavements horses when in constant use can seldom wear their shoes longer than four weeks, and often shoes are not worn nearly as long as this. But in country districts and on the farm the animal can quite frequently go longer than five weeks before the shoes are badly worn. This, of course, leads the owner to allowing the animal to go with untrimmed feet, which in time grow beyond the shoe.

The properly fitted healthy foot needs the protection of the shoe only on the bearing section. Any metal in the shoe in excess of this is superfluous. The shoe should be only as wide as the bearing surface of the foot. It is, of course, understood that the hoof is healthy and that the shoer has not pared out the foot until but a narrow ridge remains for a bearing on the shoe. The ideal bearing surface is just a trifle wider than the bearing surface of the wall. Another advantage in using a shoe the same width as the hoof wall is the impossibility of such a foot picking up stones, sticks and balling with snow. However, there are cases where the width of the shoe may vary with benefit to the foot, though its thickness, except in cases of disease or injury, should remain the same from heel to heel.

The engravings show several examples of typical shoes. At Fig. 1 is shown a double half-bar shoe, which

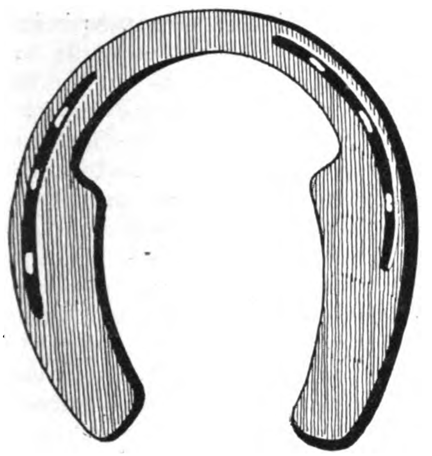


FIG. 3—A HEEL WEIGHT SHOE TO SHORTEN THE STRIDE

is very good for the cure of corns and contraction. The dotted lines show how a solid bar shoe may be formed. In both the double half-bar and also the solid bar shoe the nail-holes are best placed at the toe. This allows the quarters to expand easily. The office of the bar shoe is, of course, to give the frog pressure and to restore it to normal condition where through disuse it has become atrophied. The addition of a leather sole, with a packing of tar and oakum in the hoof before applying the bar shoe, assists materially in bringing the hoof to normal condition.

Fig. 2 is shown as a well-formed front shoe. Note that the fuller, or crease, is carried well back toward the heels to give the shoe lightness. The shoe at Fig. 3 is weighted at the heels, and is for the purpose of shortening the stride in the fore feet. Note that the fuller in this case is only as long as is necessary for the accommodation of the nail-holes, as all available weight is wanted at the heels.

The shoe at Fig. 4 is a toe-weight shoe, to lengthen and quicken the stride. The crease in this case is, as shown, carried well toward the heels, so as to make them as light as possible. At Fig. 5 is shown a very good style of ice shoe. The toe and outer heel calks are at right angles, while the inner calk is slender and dull. This prevents the possibility of the horse cutting himself, as with a sharp calk on the inside, and the outside heel calk being at right angles to the toe calk and longer than usual, the animal is prevented from slipping sideways.

Right here let me say just a word or two about nailing. Nail as low as possible to insure a good hold. Don't pierce the wall above an inch and three quarter above the shoe. A nail penetrating the white line and coming out low on the wall destroys the least possible amount of horn, has a wide, strong clinch, and has the strongest possible hold on the walls, because the clinch pulls more nearly at right angles to the grain of the wall. Finally, let me echo that already wornout phrase of caution—Don't let the rasp touch the hoof above the clinches.

This chapter on shoes would be incomplete without some reference to clips and nail-holes. Clips should be carefully made and rather light than heavy. On a flat shoe the clip should equal the thickness of the shoe, while a shoe with calks should carry a slightly higher clip. There is no reason, however, for turning great high, heavy clips on even the heaviest of shoes. The office of the clip is to assist the nails in holding the shoe and to keep it from shifting. The clip should not be hammered down tight upon the wall of the hoof after the shoe has been attached. It should not, of course, stick out from the side of the hoof, but should fit up to the wall snugly without pressing upon it.

The nail-hole is a most important feature of the correctly made shoe. Upon it depends whether or not the nail can be driven correctly into the hoof. Each nail-hole should taper uniformly from the ground to the hoof surface, that is, it should be funnel-shaped, with the large end at the ground surface of the shoe. The distance of the holes from the outer edge of the shoe depends upon the thickness of the wall. The direction of the holes depends upon the angle of the foot wall. For example, the nail-holes at the toe when found necessary should be slanted inward to some extent; those at the sides should have less slant, while those at the quarters should be punched perpendicularly through the shoe.

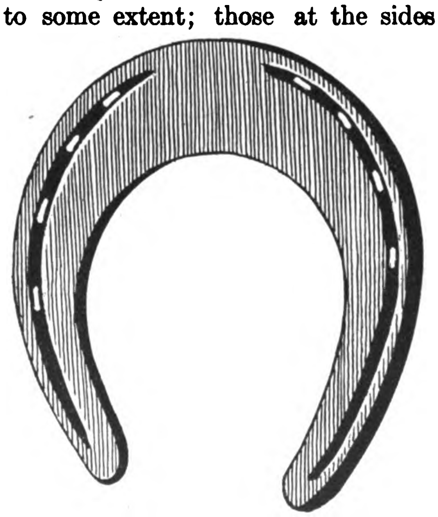


FIG. 4—THE TOE WEIGHT IS FOR LENGTHENING THE STRIDE

In conclusion, we find that the character of the nail-holes is determined by the character and shape of the nails used; their number depends upon the weight of the shoe; their distribution depends upon the condition of the hoof wall; their depth or distance from the outer edge of the shoe depends upon the thickness of the hoof wall, and their direction depends upon the obliquity of the wall.

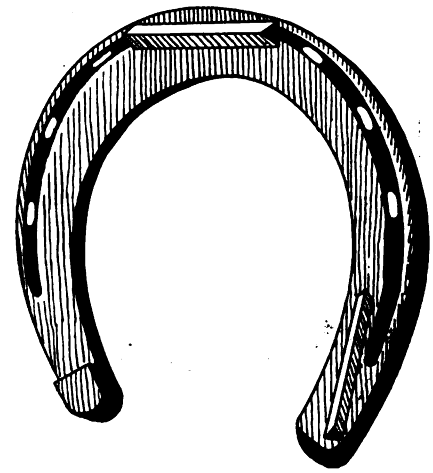


FIG. 5—A GOOD WINTER SHOE

(To be continued)

Horseshoeing Shops and Supplies in Turkey

Some Interesting Items Taken From the Consular and Trade Reports

CONSTANTINOPLE.

The only equipment of the primitive shops is a furnace and an anvil, the necessary tools and implements and a few stools. The tools used are of the simplest kind, consisting mainly of hammers, different kinds of files, a steel blade sharpened at one end, used in cutting and trimming the hoofs, rough pincers usually made by the smiths themselves and different sized punches for making nail holes in the shoes.

There are two kinds of shoes actually used in Turkey. One is the imitation European shoe, universally used; the other is the Turkish model, which differs from the former in that it consists of a single piece of thin sheet iron perforated at the center and ends. The output of the latter, which are much more extensively used in the provinces than here, is entirely supplied by a factory

owned by a Bulgarian at Tchemberli Tash, Stamboul. Although several attempts on the part of European manufacturers have been made with a view to supplying this market with this kind of shoe, they have met with failure on account of the constant alterations in the form. The coal used is either British or Turkish, which is brought from the seaport of Heraclea, on the Black Sea. Iron is mainly supplied by Germany and Belgium, by the latter country especially on account of the low terms and satisfactory quality. Nails are mostly of foreign make and are imported chiefly from Germany, Belgium and France, although a considerable quantity is made by the smiths themselves during their leisure hours.

With apologies to Farm Implement News

THE RIGHT BAIT AND A GOOD NET·WILL LAND 'EM EVERY TIME

Palestine.

In Palestine two varied methods of horseshoeing are used, the native and the European. The native shoes are solid plates covering the entire hoof, with a small air hole in the middle and curving up the back. Those known as European shoes are quite similar to American shoes.

The native shops are generally small and no blacksmith work of any kind is done. All the tools are of native make, with the exception of the rasp, which is European made. Usually as one enters these shops he sees on each side of the door elevated benches built of masonry, on which men sit cross-legged, shaping the shoes cold on a small anvil. The shoes are fitted cold and are often flattened out or curved a little, as the shoer desires. As the shoes are solid and can not be contracted, if a little too wide, the edge of the shoes is hammered on the anvil, turning a little sharp edge over.

The local shoes have two distinct advantages over the European for a dry and stony country like this. One of its superior features is that ordinarily no stones can get into the hoof, the roads generally being full of small bits of stones. The greatest advantage, however, is that the hoof thus covered keeps moist and much softer, making the liability to cracked hoofs much less.

Shoes used in these native shops are of two distinct types, as before mentioned. The native shoes are again of two distinct types, one the wrought shoes and the other cut from thick sheet iron. The wrought-iron shoes are made in Beirut and Damascus in small shops and entirely by hand. Those from Damascus have a triangular-shaped hole. Those of Beirut make have a longer V-shaped opening. The iron from which they are made is known as Russian and is imported direct from various European countries. The Damascus shoe is quite short and when placed on the hoof, the frog being pared away closely, the horse stands very much on its toes. The Beirut shoes are longer and when placed cause the animal to stand flatter. These are preferred for carriage horses. The sheet-iron shoes, known as Constantinople shoes, are imported from that city.

Shoes from these three sources are sold to the shoers by weight, in the rough, and are worked into shape by them cold. In the case of the wrought shoes the ends are rivetted together, overlapping, and then curved up a little. The edges are hammered so as to produce a sharp edge on the underside to prevent the animal from slipping, and, last of all, holes are punched. The Constantinople shoes are worked in the same way, except that they do not need the rivet. There is a market in Jerusalem, I am told, for from ten to fifteen tons of these sheet-iron shoes in the rough per annum. They are not, however, considered as good as the wrought ones.

The European-shaped shoes are also made in Beirut and are finished ready to be put on when sold to the shoers, who only shape them cold a little, as may be found necessary. The number of these used, however, is small in comparison with those of the local form.

Use of Nails. European Shoe Little Known

The native nails are also made by hand in Beirut and Damascus and sold in the rough to the shoers who straighten and sharpen them by cold hammering. Nails the same shape as are used in the United States are imported in largest quantities from Italy and Sweden, while the best come from Germany. These are being used now quite freely. With the European-shaped shoe they are

used entirely and with the local shoe they are being used extensively where the hoof is poor, and for carriage horses they are used on the inside edge of the shoes only.

In Jerusalem there are only two European blacksmith shops doing regular European shoeing. One is run by Germans and the other by an American who learned the trade from the Germans. They are mostly patronized by the foreigners. The natives object to burning the hoof with the shoes and prefer to patronize the native shops, even when using the European-shaped shoe. In the villages and small towns, except Jaffa and the Jewish colonies, the European shoe is unknown. These shops correspond to our general American blacksmith shops, doing new and repair work on vehicles, as well as other regular blacksmith work. The tools are such as are used in ordinary shops, the German style prevailing. Shoes are all made by hand by the smiths themselves. The best iron is imported from Sweden and a poorer quality from Belgium. Nails are imported from Germany, Italy and Sweden. Coal comes from Cardiff. Tools, such as rasps, buttresses and hammers are of German manufacture, while the simpler ones are made by the smiths themselves.

Grain thrashing in this country is done almost entirely by cattle treading it out, and such cattle are shod with iron shoes, one on each half of the hoof. Up till now the shoes have been made by the shoers themselves, but a sheet-iron shoe is now being introduced.

Aden

Horseshoeing in southern Arabia is a separate and distinct trade from blacksmithing. The blacksmith has his established shop, where he has his tools, forge, etc., and awaits customers. The horseshoer is an itinerant, having no shop but his kit of tools in a basket. He mounts a donkey and rides to whatever customer may have summoned him. He carries no forge, for he puts the shoes on cold.

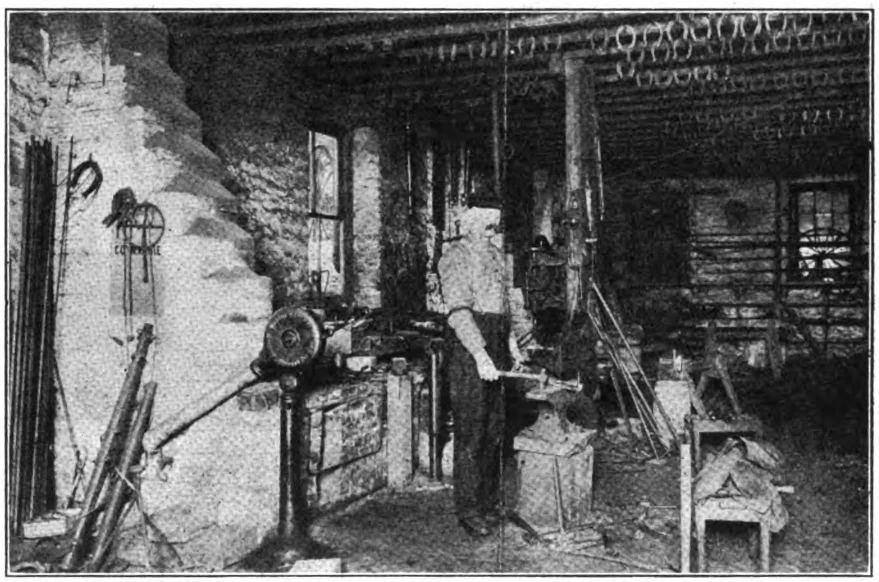
The blacksmith's simpler tools, such as pincers, tongs and cutters, he forges for himself from models imported from Germany, Belgium or England. The larger tools are imported from some one of these three countries. His materials, wrought and pig iron, nails, screws, bolts, etc., are mostly imported from Norway, Sweden and Belgium. The blacksmith's sharpening wheel or grindstone is an interesting implement of excellent quality made by himself. It is about 18 inches in diameter and ½ inch thick. It is made of a composition of Indian lac or wax and pulverized corundum crystals brought from Makalla and Shehr, provinces on the southern Arabian coast, 200 miles east of Aden. The coal used is either a fine English coal dust or, what is more commonly used, a superior kind of charcoal, baked and pressed into cakes and brought from the interior of the Yemen by caravan.

The horseshoer's kit usually consists of a file, a strong, sharp knife, a hammer, a small square piece of wood with a hole in the middle, used as a stand for the hoof, a strong piece of rope with a knot to fasten the horse's knee, a packet of nails, a nail puller, and a number of different-sized shoes. The horseshoer buys his shoes either from the blacksmith or from the shops of the Bhoris, Persian Mohammedans of the Shiah sect, who are the principal merchants in iron and tin wares. A horseshoe of ordinary size costs from two to five cents, according to the amount of iron. The tools of the shoers also are bought from the Bhoris and come mostly from Germany, the nails from Norway and Sweden.

Aleppo

The equipment of the Syrian horseshoer is far removed from that of European and American shops. The hammers are a peculiar, slender variety, 7 or 8 inches long, and the nippers are very inferior and of the most ancient type. The knives are most of a draw-knife style, with two handles and of very doubtful quality. No forge or other heating apparatus exists; in fact, the shops contain nothing but a limited supply of flat, oval shoes, huge, hand-made nails, and the tools mentioned. All shoes are brought from Constantinople, at 7 piasters a botman (22.64 cents per 7.05 pounds), in the curved, oval shape, about ⅛ inch thick. The nail holes and a hole about ¾ inch in diameter in the center of perhaps half of them are made by local workmen not connected with the shoers. The nails are a heavy, clumsy variety, manufactured locally by hand and cost 14 piasters a botman (45.28 cents per 7.05 pounds). A few factory-made nails are imported from Switzerland and Germany.

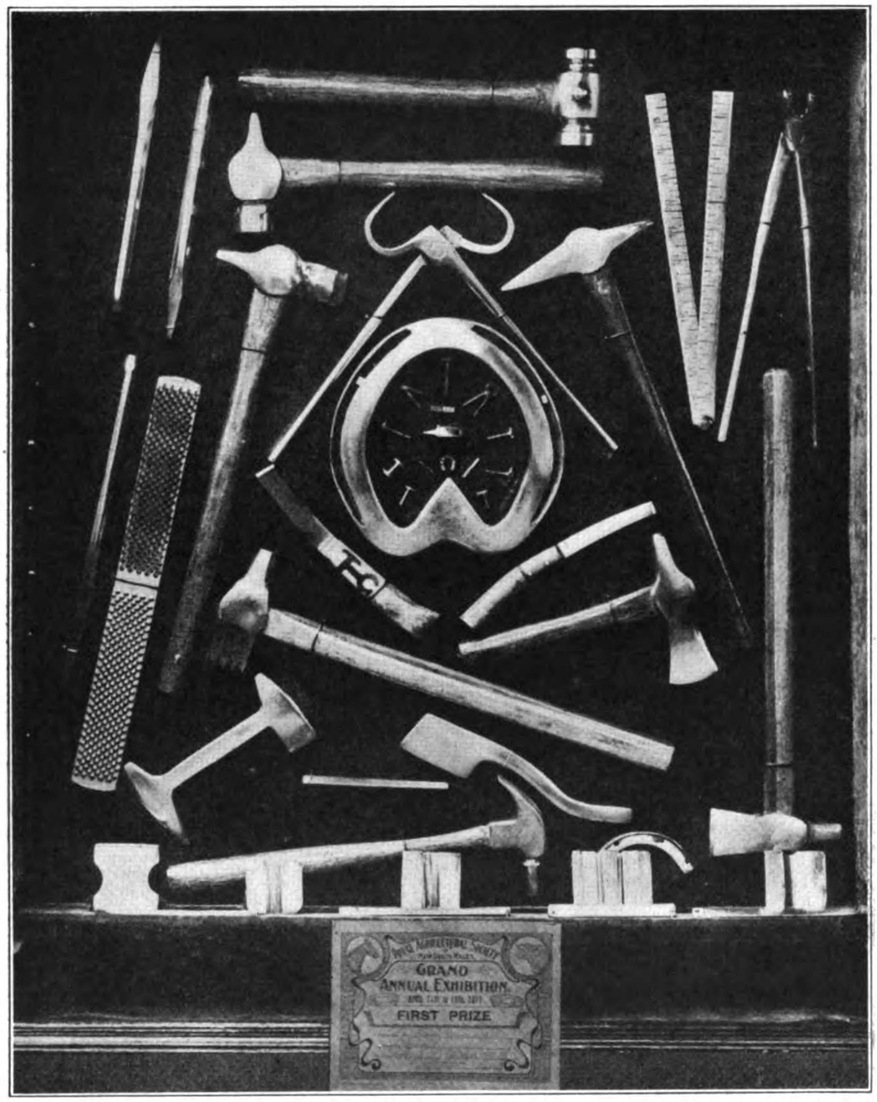
The blacksmith does no horseshoeing and the horseshoer no blacksmithing. The shops of the blacksmiths are much superior and are modern and up-to-date. They are supplied with forges, to which are attached modern bellows, and they have vises, dies, hammers, tongs, saws, drills, files and other iron working tools and machinery similar to that commonly used in American ships. Most of these are of French make. What coal is used is imported from Great Britain. Iron is imported from Belgium for the most part, and it is purchased through Aleppo commission houses.



THE ONTARIO SHOP OF MARSHALL AND BOLTON. THEY SPECIALIZE IN SHOEING, STEEL WORKING AND TOOL MAKING

Smyrna

The horseshoers' workshops of Smyrna are, as a rule, of a primitive character. The tools used are mostly primitive and consist of an anvil, a heavy hammer for beating out the shoe and making nails, a rasp, light hammer, pair of tweezers and a hoof parer for shoeing. Some shoers who make shoes of soft, malleable iron, which are beaten out cold, also have a guillotine for cutting the iron into shape. The price for shoeing a horse is 18 cents and for a donkey 9 cents. Two kinds of iron are used in the manufacture of shoes. One kind is imported in strips measuring 6 feet 8 inches by 4 inches, chiefly from Belgium and Germany. These strips cost 4.2 cents per 2.2 pounds. Shoes made of this iron are roughly trimmed and beaten into shape while cold. The other shoes are manufactured of scrap iron, collected locally. In order to heat this iron a special charcoal, made of soft pine, burned in the interior of the Province, is used. Forge coal is not used, as it does not produce so good iron as that made with charcoal. Two kinds of nails are used. The one is imported from Europe and although a much neater looking nail it is not considered so good as the nail manufactured locally. These nails are used only on the open horseshoe, which is known here as the European shoe.



A CASE OF FARRIER'S TOOLS THAT WAS AWARDED FIRST PRIZE

Harput

Horseshoeing in this interior country is practically in the hands of the man who would be considered a kind of livery-stable keeper in the United States. He rigs up a little shop in the room in which horses and donkeys are lodged, in which he has his horseshoeing supplies and implements, a work bench, an anvil and a smaller, upright anvil on which the nails are finished, but a forge is never used. The tools employed are not very many and are calculated for only the simplest kind of work. The knife used in paring and trimming the hoof is unlike the knife used for this purpose in the United States, having a blade of about 3 inches, with the handle extending along the side of the instrument. The edge of the knife is on the lower side, and in order to cut the knife must be drawn toward the user. The shoes are brought in from Constantinople, and none are ever made here. In the import returns for the city of Harput for the year 1909 it is shown that horseshoes to the value of $6,200 were imported, and this, if anything, is underestimated. The cities of Malatia and Diarbekir, of this consular district, each import an equal if not greater amount, and from this it may be fairly estimated that from $20,000 to $25,000 worth of shoes are imported each year. The shoes are of a solid piece, entirely covering the hoof, with the exception of a round hole in the middle about half an inch in diameter. A forge is never used in fitting the shoes; they are hammered cold by hand into the shape desired for the foot. All the nails are made locally by hand, wrought not quite so long as the custom-made nail; the head is heavier and each workman shapes them according to his fancy.

Bagdad.

Though Arabia is the home of horses and Bagdad is famous for the thousands of donkeys which pass in and out of its gates in the great freight caravans, horseshoeing as an art is poorly developed. The shops are small and dingy and the few crude tools include an anvil, hammer, a knife, a pair of rude pincers and a twitch for holding the noses of animals that resist being shod. The shoes are made in Bagdad from iron imported from Belgium and England and sell at $2 per 17 pounds. Some of the shoes are almost solid plates, with only a small opening in the center. Coal used in the forges comes from England and nails from Belgium and England.

Trebizond

The workshops where horseshoeing is done in this part of Asia Minor are small, primitive places with very

TWO CALIFORNIA SHOPS—MR. McCOMBS DOES THE WOODWORK WHILE MR. FISHER DOES THE IRONWORK

little equipment in the way of tools, appliances and material. The few cheap tools used are generally of native make and include pincers, tongs, hoof parers, files and chisels. A considerable portion of the Turkish style of shoes comes from Constantinople. Very few European horseshoes are brought here from Russia and Constantinople. Most of the imported nails come from Russia. Nails are still to a considerable extent made by hand in the interior of Asia Minor. The iron comes chiefly from Belgium and Sweden. Coal is not used, charcoal of local production being employed.

MERSINE

The old-fashioned brick stove, covered with a large hood of sheet iron, is still used, as are a large pair of bellows, an anvil about a foot in length, a hammer and a gimlet to make the holes wherein the nails are inserted. All the horseshoes used in this part of Turkey are made locally. A number are made by machine in Mersine, but most of them are produced by the blacksmiths themselves. They consist of flat pieces of iron covering the entire base of the hoof. The iron is imported, mostly from England. No coal is used; only charcoal is burned and this is always made from pine wood. It will burn only with a diligent working of the bellows.

BEIRUT

The tools used by blacksmiths and horseshoers in this country are primitive; they are generally native made with the exception of large and small files which are imported as a rule from Europe and America. Shoeing supplies are obtained from Russia and England.

A Prize Collection of Farriers' Tools

To encourage the making of farriers' tools by the man who uses them the Royal Agricultural Society of New South Wales offers prizes at their annual exhibitions for the best displays of horseshoers' tools. The Australian shoer, especially if located in a country district, often finds it necessary to make his own tools, and the purpose of these exhibitions is to stimulate interest in the making of the best possible.

The accompanying engraving shows a case of tools made by Mr. Thomas Goodwin, Jr., of New South Wales, Australia, and which was awarded first prize, and also a special prize of a silver medal at the 1911 exhibition. Inside of the bar shoe is a set of miniature tools made of copper.

More Record Shoeing

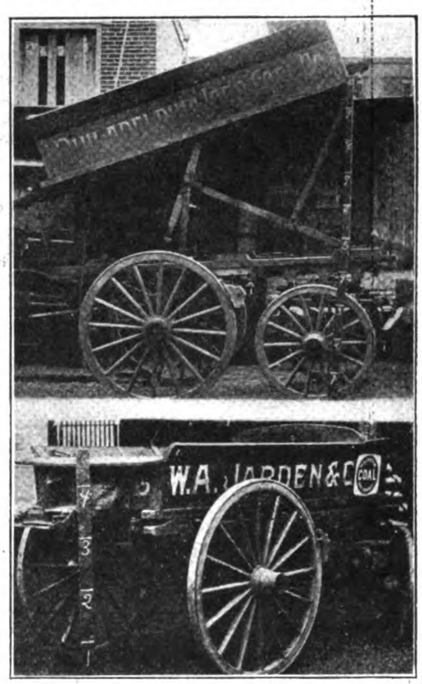
HARRY WILSON

We read with interest the item telling about the fast horseshoer who holds a record of driving on four shoes in five minutes and twelve seconds and that the shoes stayed on for four months. That is certainly a record, but we have a man in Des Moines, Iowa, who drives shoes every day and has put four number eight shoes on a 1650-pound horse in five minutes and nine seconds, and never thought anything of it. He stands ready to meet this fast man from Texas any time or at any place for any amount of money. The State of Texas and County of Coleman will know that we have a fast one in the State of Iowa and County of Polk. Another thing I wish to mention is that if the horse had those shoes on four months, as stated, he must have stood in the barn all the time. I hope we can arrange a match with this Texas speed marvel.

Offers One Hundred Dollars for Tire-Setting Demonstration

W. K. HUFF

When I wrote my first article on cold tire setting I intended buying a cold setter if some brother could answer my only question. Several brothers have told us since then how they could set tires, but not one has explained how a tire can be made smaller than the wheel while the tire is on the wheel. I wish I could shake hands with Brother Shay of Pennsylvania. Think he has told us more truth about cold setters than any one. Note what Brother Smith of Kentucky says—he seems to be well posted. He supposes I am from Missouri and says he will show me that I never put a tire on a wheel that was smaller than the wheel upon which it went, that the tires are always larger than the wheel when I put them on and remain



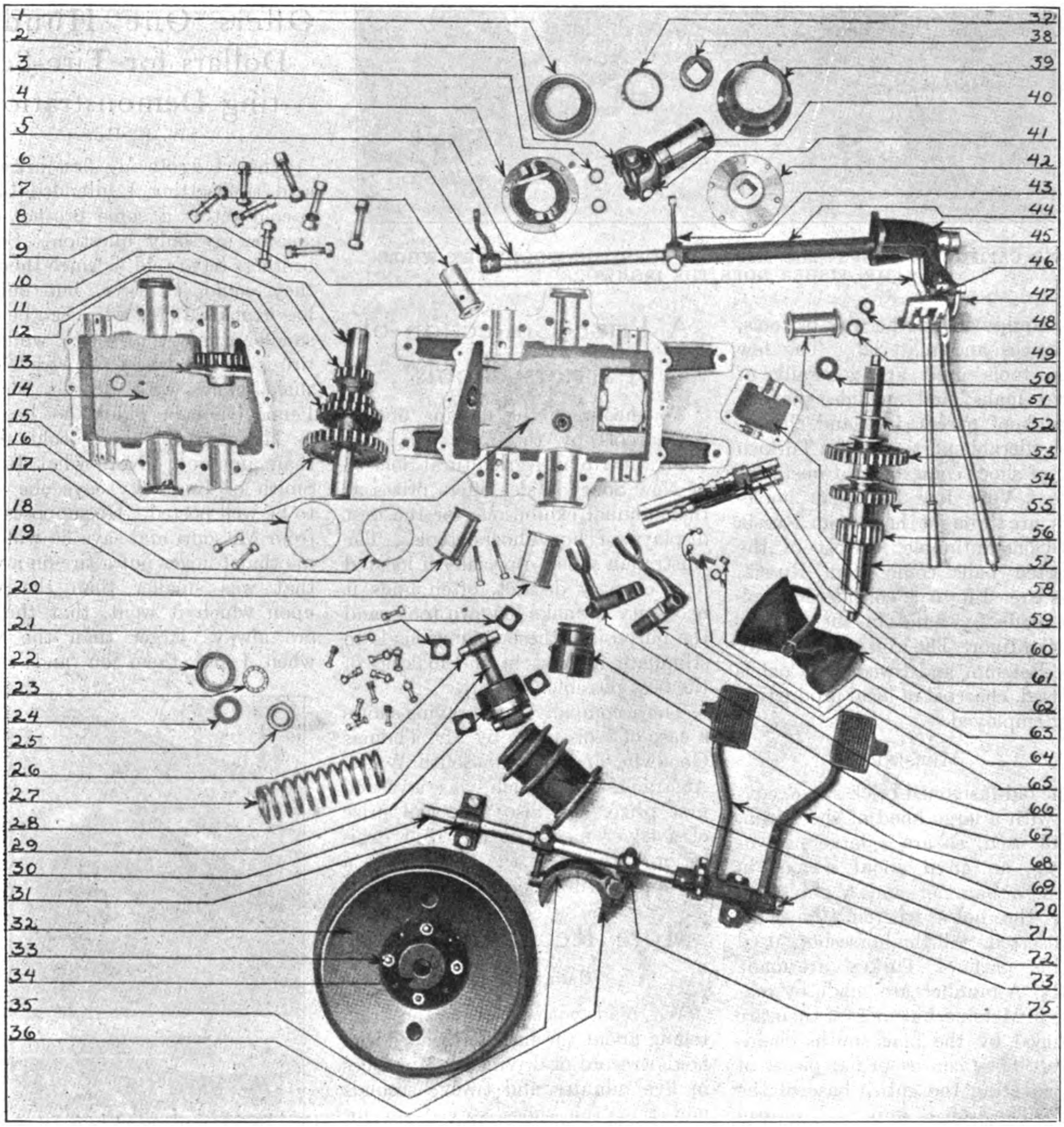
THE EAGLE COAL CHUTE WAGON
Made by the Eagle Wagon Works of Philadelphia
Showing Box Raised and Lowered

larger as long as they stay on. What do you think of such a talk, brothers, from a man living in the land of fair women, good whiskey and fast horses?

Note what Brother Jeffries of

Missouri, the land of big red apples, has to say. He first tells what a lot of tires he has set in a few moments Say, Brother Jeff—don't tell it too loud. Some of your customers might hear you and think you were robbing them. He tells us how he sets them cold, but he doesn't tell us or me in particular how he makes them smaller than the wheel.

Why do they put tires on locomotive drive wheels with pressure? Because they have to be a fraction smaller than the wheel they go on. It would be impossible to shrink these tires on cold, because the tires would have no tension. It would be the same size of wheel and would drop off just as soon as it got a little warm and expanded. Now, brothers, it is my honest opinion



THE CLUTCH AND TRANSMISSION OF THE HUDSON CAR

1—Outside casing for universal joint
2—Journal
3—Journal bushing, grooved
4—Flange yoke
5—Brake shaft
6—Brake shaft and lever
7—Counter shaft bearing
8—Hand lever
9—Counter shaft
10—Counter shaft reverse gear
11—Low gear
12—Intermediate gear
13—Reverse idler gear
14—Lower half of case
15—Counter shaft drive gear
16—Upper half of case
17—Universal joint boot collars
18—Universal joint boot collars
19—Counter shaft bearing
20—Main shaft drive gear bearing
21—Pin blocks
22—Clutch spring seat
23—Ball bearings and cage
24—Thrust bearing washer
25—Grooved bearing
26—Clutch to transmission shaft pin
27—Clutch spring
28—Clutch to transmission shaft
29—Universal joint yoke sleeve
30—Rocker shaft
31—Rocker shaft bracket
32—Cone
33—Cone hub stud
34—Cone hub
35—Clutch throw-out yoke
36—Grease cup
37—Casing lock nut
38—Dust cap
39—Flange yoke
40—Sleeve yoke
41—Sleeve yoke
42—Compression flange
43—Hand lever shaft shifting lever
44—Hand lever shaft
45—Quadrant bracket
46—Hand lever gate
47—Brake lever quadrant
48—Nut
49—Washer
50—Washer
51—Main shaft bearing
52—Main shaft thrust washer
53—Low and reverse main shaft gear
54—Main shaft
55—High and intermediate main shaft gear
56—Main shaft drive gear
57—Main shaft
58—Transmission case cover
59—Low and reverse gear shifter bar
60—High and intermediate gear shifter
61—Shifter lever gate
62—Universal joint boot
63—Nut
64—Spring
65—Nut
66—High speed shifter yoke
67—Low speed shifter yoke
68—Universal joint yoke
69—Brake foot lever
70—Clutch foot lever
71—Universal joint yoke
72—Rocker shaft collar
73—Rocker shaft bracket
75—Clutch shift lever

that in a few years you will see most of the cold setters in the scrap pile. Don't be in too big a hurry to blow up a new machine and induce some other brother to get stung and part with his hard-earned money.

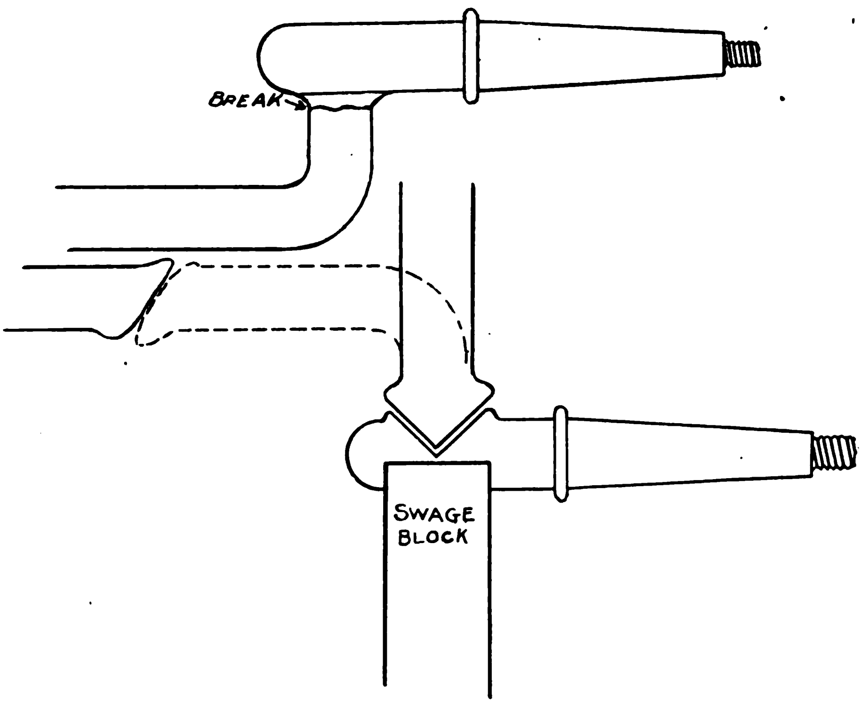
In conclusion will say, I will post $100 against an equal amount and set tires the old way against any smith setting with his cold setter of any make. Results to be judged by six disinterested men to determine which tires stay tight longest and which wheels are in best condition.

Don't misunderstand me when I say a tire must be smaller than the wheel when on the wheel, but I do say it must have a tension or draw, and to get this the tire must measure smaller than the wheel when set the old way. Then we heat it all around to expand it, so the expansion overcomes difference in size of tire and wheel, then, when cooled off, the tension is equal all 'round the wheel. If set cold, the felloe on rim is shrunk at the same point which the tire is. In other words you shrink the tires and felloe all together, therefore the tire never gets any tighter. I would be pleased if some brother would call my $100 proposition.

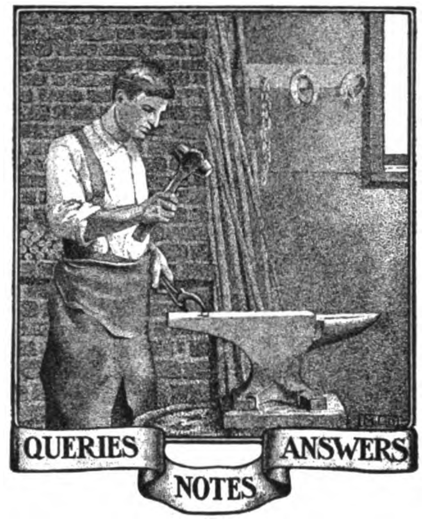
How to Repair a Broken Axle

Bert Hillyer

There are two ways of repairing this axle, but as one way is far simpler and better than the other I will explain only the best way. In the first place take accurate measurements of the axle, so that when finished it will be the same as it was before it broke. Now, it would not be wise to weld it where it has proven itself the weakest, so we look for the strongest and easiest places to weld. These places are the straight part of the stub and the straight part at the bottom. Starting with the stub end cut off the part that is broken as far as the fillet, then upset. In doing this cool off the end so that when the metal is increased in size it will be in the right place for welding. Then cut out a V-shaped piece in which to weld the stem. The V should be cut out at an angle of ninety degrees, or so that a square placed in cut will touch bottom and sides, and the cut should be nearly half the thickness of the iron in depth. The stem part is then forged the same as a bolt head that is made from the solid, either by drawing out or upsetting on the end and forging into a square head. Two sides are then cut down on the head which forms it into a V-shaped piece that will fit into the V in the stub. Then take a good, clean welding heat, place the stub end in the swedge block and weld the V-headed stem into the stub, using a round edge set hammer to do the welding. If good heats are taken and a good helper does the striking I am positive that a good weld can be made. I have used this method repeatedly on large stock and have yet to find the first defective weld. The axle is then bent in the corner and welded onto the straight part with a common weld, which needs no explanation.



HOW TO REPAIR A BROKEN AUTOMOBILE AXLE



To Shoe a Striker.—Would any brother tell me through the paper how to shoe a horse that strikes in front, way up by her knee? Wm. M. Peot, Wisconsin.

A Question on Rubber Tires.—I would like to ask my brother craftsmen if there's any way to melt old rubber so as to mend automobile tires. Any information as to mending tires would be appreciated.
A. A. Blochberger, Missouri.

A Mower Repair Hint Wanted.—I have a McCormick mowing machine with the jack shaft broken off up in the casting at the pitman. Will some brother tell me how to get it out without bursting the little gear that is screwed on the other end? I would appreciate any information on this subject. T. J. Steadman, Florida.

Has an Oxy-Acetylene Plant.—My shop is 25 by 60 feet. I have a 4-horsepower gas engine and do all kinds of work. I have an emery grinder, a buffer, a saw gummer, a circle saw, a trip hammer, a grindstone and a blower, all of which I run with power. I also have an oxy-acetylene welding plant with which I can weld any and all kinds of metal, cast iron, steel, brass, copper and aluminum. G. S. Davis, Kansas.

A Case of Dropped Sole.—I want to tell you about two horses I have to shoe, and ask for some advice. These are large, heavy horses and have an unnatural growth in the bottom of their feet. This growth covers the bottom of the feet from the toe almost to the heel, and has grown down considerably lower than wall of foot and is white and bleeds if trimmed much. The wall of feet grows but very little. Would thank you very much if you can tell me what to do for them. J. B. Chappell, Alabama.

From a Veteran of the Craft.—I have shod horses for 53 years and have always been well until last year. I will be 73 in October. Have always liked the paper. One brother, a while ago, asked if when a wheel was rim-bound with spokes loose in the felloe how could it be set with a cold tire setter? I never had any trouble when I could work. I took out the joint bolts and some of the others, so I could remove the rim. Then I took my hack saw and sawed out the rim until it was all right. I then knocked the rim to one side and wedged the spokes that were loose in the felloe and then put the felloe back and set the tire.
C. Eastman, Pennsylvania.

A Power Shop of Missouri.—I like "Our Paper" very much, and am very much interested in the cold tire setting controversy. I have not taken a liking to the machines as yet and don't think that it will ever pay me to put one in my shop, because about one half of the work has to be done the old way, anyway. I am running a one-man shop, have a 6-horsepower Gade air-cooled engine, a band saw, a rip saw, a Star power hammer, a Universal boring machine, a disc sharpener and a corn crusher and power sheller; also a good equipment of other tools, pipe tools and wind mill outfit. I also sell gasoline, cup grease and auto cylinder oil. Get very good prices and have all I can do.

SANFORD BAKER, Missouri.

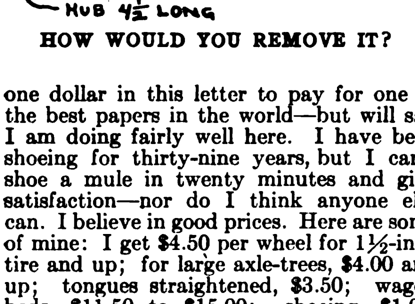
About Shoes and Shoeing.—In answer to H. J. Devonshire, New Zealand, in July number, regarding shoeing a forging horse. Shoe with a heavy concave shoe on fore feet with short toe and keep heels high, no calks. Shoe with a light shoe behind, with two clips on each shoe. Set the shoe so that the hoof projects in front; then he cannot make any noise if he happens to strike.

In answer to W. E. Miller, Minnesota, regarding size of shoe by measuring the foot. The rule is two times the breadth and add for calks. Say the foot is 6 inches; you will need 13 inches of stock, or for a flat shoe 12 inches would go around the foot, unless it is a mule, and those I know nothing about. Foundered horses must all be shod flat, the shoe to be thin at the toe to let him get over. Horses that are foundered lose the power of their fetlocks so that they rock in front. Use a broad web shoe and convex it so that the sole can be cleaned out with a hoof pick. DONALD MCMILLAN, Scotland.

To Remove a Gear Wheel.—In placing the 14-inch gear wheel on a McCormick mower we heated it (it is machined smaller than the shaft); before it was in place it stuck in the position shown in the engraving. Sledging and heating the wheel have failed to remove it, as also has heating the shaft. How can we remove it?

A. M. JONES, Illinois.

A Letter From Arkansas.—Now, I am too busy to write very much, but will say that I am in the blacksmith business in the southeast part of Arkansas and am very busy just now—hardly got time to slip one dollar in this letter to pay for one of the best papers in the world—but will say I am doing fairly well here. I have been shoeing for thirty-nine years, but I can't shoe a mule in twenty minutes and give satisfaction—nor do I think anyone else can. I believe in good prices. Here are some of mine: I get $4.50 per wheel for 1½-inch tire and up; for large axle-trees, $4.00 and up; tongues straightened, $3.50; wagon beds, $11.50 to $15.00; shoeing, $1.00, $2.00 and $3.00; $1.50 for plain, $2.00 for toe calks, larger shoes come at more money. In closing will say I collect everything that goes on my books. I am fifty-four years old and can learn yet. I am about to sell out here and want to go to Colorado or Oregon and would like to hear from some brother up there. S. D. WALLIN, Arkansas.



HOW WOULD YOU REMOVE IT?

Apprentices and Fast Shoeing.—Brother Morrison is all right on the apprentice proposition. I believe in treating them right. They are human beings just like the boss. I shall never forget when I was a cub I was treated as though I were a dog; but I stayed with it and now own the business which my boss had, while he has nothing.

Now about Mr. Layne, of Texas. He doesn't say whether he fitted the shoes and put them on in five minutes or not, but that makes no difference, because he couldn't do it anyway. I have shod horses since I was sixteen years old and I believe I can put four shoes on as quickly as anybody, although I can not do it in five minutes—neither can any other man.

I believe if I were the editor of this magazine and got such trash to publish, and I didn't have anything else to fill up with, I would leave a page or two blank and tell my subscribers that I had run out of sensible matter and couldn't fill up.

E. L. STEWART, Kansas.

Questions on Various Topics.—I am having trouble making welds. I think my trouble may be partly, if not altogether, due to sulphur in the coal. Of this I am not sure. When I make a weld the steel scales very profusely and refuses to unite. After taking several heats I usually get it welded, but have been unable lately to get welds to unite at the first heat. There is a white deposit left on the anvil around the iron being welded. Will poor or sulphurous coal give such results? Any help that you can give me through the columns of THE AMERICAN BLACKSMITH will be appreciated.

I should like to learn how to braze. Can you or some of your readers tell me how? Will a brazing torch braze cast iron, iron and steel?

I should like to hear from the Editor and readers in regard to the comparative merits and demerits of the different kinds of tire shrinkers.

I should like to hear from someone who knows about the Mole and Champion.

Of what material are buggy axles and stubs made? Are the spindles or parts that fit into the boxes and the square part made of the same material? Are the stubs made of the same material as the main central part of the axle?

SANFORD E. FRAZELL, Nebraska.

A Shopful of Home Equipment.—My shop is 16 by 70 feet and I have a 4-horsepower I. H. C. engine which I like very much. I run a 13-inch jointer which I made myself and which is perfectly satisfactory. I have 8 saws ranging from 5 to 28 inch in both cutoff and rip. I have a jig saw that I made myself on which I saw out all my rims and similar work. I also made a lathe and can turn any length up to 10 feet. I run my drill press, emery wheel, grindstone and everything that turns with this engine. I would go out of business if I had to do without my engine. For a side line I sell general merchandise with the help of my wife. I have a National Cash Register, a Wilmore Computing Scales and an Oliver Visible Typewriter. Have all the work I can do at all times. I have been at the trade for 12 years and do all kinds of work. I followed carpenter work for 6 years previous to taking up shop work. I make a great many plows, harrows, doors, door and window frames, patterns and such things, and I get good money out of this line. I have my engine mounted on a low-down wagon and can use it outside the shop any time. I get someone to go out in fall and saw wood for the farmers and this pays very well, as I get 50 cents per hour. I make it pay the farmer, too, so I have no trouble in getting the work.

J. G. CLOWER, JR., West Virginia.

A New Zealand Shop.—I cannot say too much about "Our Journal." I think it gets better every month and I should never be without it. I enjoy the various discussions regarding shoeing, etc., and especially those articles of Mr. J. C. Weaver. The great thing he has in his favor are the hard roads. If he were over here and had some of the horses up to their bellies in mud half the time I guess he would have a different tale to tell.

THE NEW ZEALAND SHOP RUN BY MR. W. C. SIM

I am sending a small photograph of my shop. I have plenty of work this winter and can just keep ahead of it. I copied the "Blacksmith's Ten Commandments" and pasted them up in my shop. The customers think they are just about right. I do wish Benton would drop into my shop, as I think he could put me up to a wrinkle or two. WM. C. SIM, New Zealand.

He Favors Cold Setters.—I see in the July number of "Our Journal" a discussion on cold tire setting. Mr. J. Shay, of Pennsylvania, seems to think that cold tire setting is not a success, but I think if Mr. Shay has got the right kind of a setter that he could do the work perfectly. I have got a Brooks Cold Tire Setter and I can shrink a tire on any good wheel so it will not come off or give any trouble, and I do not injure any rim. When I set the tires I place the wheel in the machine and put the tire down until it begins to get pretty tight, and then for heavy tires I take a 4-pound hammer and I pound the tire good all around the wheel and keep pulling and pounding and can sink the tire into the felloe with my cold setter. The pounding will cause the tire to slip on the rim and the setter will take it up, but you must use good judgment as to whether your rim needs cutting out or not before you go too far. I would give up any tool in my shop before I would let my setter go. R. R. NORRIS, Alabama.

Painting and Wood Storing.—I wish to thank the brother who informed me that my engine was not getting enough oil. It has not been shooting since I increased the feed and I think it just and proper to thank a brother when he gives you the goods you ask for.

Don't use much oil in the paint for buggy work, and you will find it pays to buy the paint in paste form. To stir and mix paint I use a large-size egg beater in a can about the size of a tomato can. I can get a better mixture in this way than to stir with a paddle. This way the paste and driers are mixed good. Try it—a beater costs ten cents.

I have ash and hickory and other lumber in stock for three years and not a worm or a sign of one. I use common barrel salt. When the lumber comes from the mill I pile it, salting each layer a little. As soon

as this salt disappears I re-pile it so it will dry. If you use too much salt it will appear in wet weather on the lumber as a brine. I also wet all hickory spokes with salt water as soon as they come in my shop.

My shop is 30 by 30. I work two men beside myself and I am two weeks behind, now. I do all kinds of work and repaint buggies and repair tops.

O. R. MANVILLE, Missouri.

The Treatment of Apprentices.—This is my noon spell and I have just received my Journal. In scanning its pages I read the account of W. W. Morrison on the Apprentice Problem and, believe me, that very letter of Brother Morrison's hits the nail right on the head, and I am through, for my part, in writing anything further on the subject at present. James R. Dowd, in the August issue, says that a man never has the trade learned until he can make all the tools he uses in his shop. Well, he can work until he is unable to be in a shop and some of those young "scabs," as he calls them, may teach him something then. It is a shame to call anyone trying to make an honest living "a scab," with apologies to Mr. Dowd.

In the town where I was working there were three shops and all good mechanics, and they got to cutting prices and running each other. Does he call that "scab work," or does he mean by a "scab" a poor young fellow who works four years at the trade and learns little, and then starts to try and earn an honest living for himself at the trade?

There is a very good reason for so few men learning the trade, and that is just what Brother Morrison has to say. A young man can make two dollars and two twenty-five a day at other things right here where I am, and why should he work under some of the tyrants in a blacksmith shop, with his nose to the shop floor from daylight until dark, shoeing horses for wages that will not allow him to clothe himself decently. I say, emphatically, that a boy is foolish if he tries. I give Brother Morrison all honor in writing his views, and if Brother Dowd had to learn his trade where I learned mine he would not call anyone a "scab."

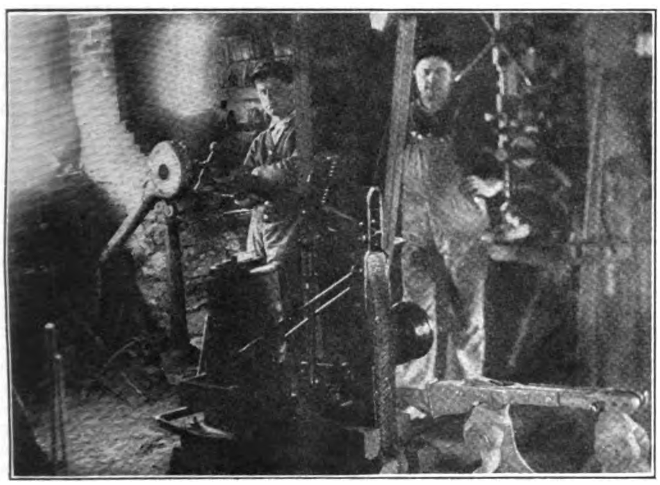
I think that all apprentices have a hard time learning the trade. You will all agree that it is hard work and when they can make more money and learn other trades why should they learn blacksmithing? The helpers here get seventeen and a half cents an hour, and we have every appliance to work with. No more general work for me, nor do I wish to have my experience over again. I kept my word—I served my time, but I would rather go ditching than put up with my experiences during apprenticeship. Perhaps you may think I am severe.

This Journal is just my delight, and I read it from cover to cover and would not be without it for anything. I am not an expert by any means, but I do not think I need to work under any man any longer to learn my trade. I am learning every day under a master mechanic, and he is a MAN from head to foot, and I know how to work for a good man. I can work hard all day for him because he comes to you in a pleasant way and appreciates your work. And isn't it just as easy to be pleasant as to be grouchy?

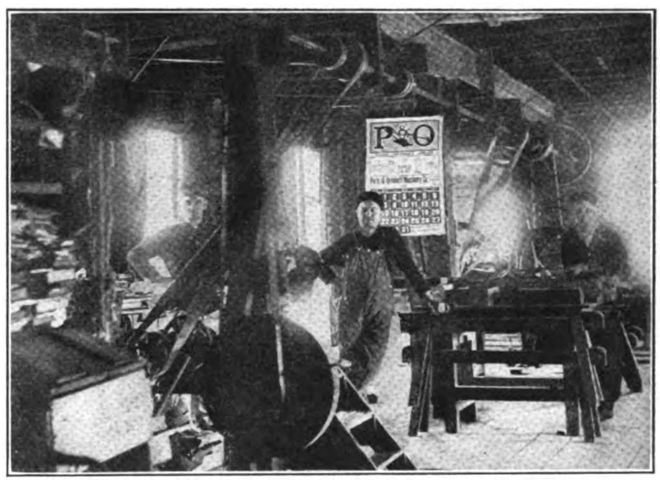
SMITHWORKER, Ontario.

A Well-Equipped Missouri Shop.—The accompanying engravings show two interior views of my shop. One picture shows the wood-work shop and the other is a picture of a trip hammer we made ourselves. It is easily made and does the work to perfection. If there is any brother smith interested in trip hammers this hammer is very simple and easily operated and any smith can make one. We would not do without it now. It comes very handy for sharpening plows. We can sharpen a lay in half the time and do it better and easier than the old way. And we can say there is nothing like power in a shop. We put in power five years ago when we could not begin to do all the work. Our business has increased fifty per cent since we put in power. We have all kinds of tools, for if a smith and wagonmaker wants to do all kinds of work, it takes all kinds of tools to do it. Our power is a 10-horsepower International engine. We have a 20-inch Fay and Egan planer, a 12-inch jointer, a band saw, a rip saw and a 15-inch swing saw, a hub boring machine, a disc sharpener, a tenoning and boring machine, a 12-inch lathe, a grind stone, emery wheels, a thread cutting machine and House cold tire setter, 2 anvils, 2 blowers, 2 forges and 3 work benches and the trip hammer. With all these tools we can do almost anything that comes along. We would advise any brother smith to put power in his shop if he wants to increase his profits.

KOCH BROS., Missouri.



KOCH BROTHERS MADE A POWER HAMMER FOR THEIR OWN USE



THIS MISSOURI SHOP IS WELL EQUIPPED WITH POWER TOOLS

Side Lines for Blacksmiths.—I want to tell some of my experiences and observations with side lines. I first started to learn the moulder's and machinist's trade at a small shop. The boss was doing a very good business, but the blacksmith shop just beside him was also doing a good business, and he concluded that a side line was the thing. So he rigged up a blacksmith department and hired a smith at $2.00 per day. He did not have enough work to keep him busy all of the time, so to keep him working he had him make clevises, reach pins, center clips, and sold them occasionally at ten and fifteen cents each. I don't believe they cost him more than forty or fifty cents each, counting time, coal and material. Then he concluded that feed grinding was the thing to make money. He put in a feed mill and we ran that for him, but the cost of the coal and our time could not do much good. One day a farmer came in and wanted some cornmeal ground. The boss said that was just the system, and fixed up a bolting rig and we put out a few sacks. But that was not quite up to the standard, and he could not sell more than one sack to a customer. Then he was persuaded by a very smooth guy to rig up and make patent farm gates. We made a few, but it did not pay very well because the cost of production was too much for what he could get for them. He then made up his mind that the wood-sawing business would be the thing, so he rigged up a saw outdoors to saw wood for stove use. The next thing was a rock-sawing outfit which was quite a machine. It required quite a bunch of rock and several loads of sand to start the thing, and I was given the job of shoveling the sand on top of the rock.

The blacksmith and myself were kept busy moulding, blacksmithing, making gates, sawing wood, grinding feed and sawing stone, but most of our time was put in running from one to the other. When night came we had nothing done, and the boss, having such a vast business, did not have time to do anything. When someone came in for window weights or other castings, of course they would not be ready. His machine work was neglected on account of too many side lines.

Finally, after a time, the customers that wanted castings and machine work done would go elsewhere, so business dropped off in all lines. His bank account was exhausted and he found himself with a lot of junk on hand, worth about thirty cents. We were out of a job and he was sold out and went to work by the day.

Now, the moulding trade is easy. In the two years that I worked there I learned how to go out to the scrap pile and pick out the cast iron from the wrought iron and steel, break it up with a big sledge, carry it into the foundry and throw it up on the platform. I would carry up two bushels of coke at a time, get in the cupola and pick all the slag off the firebrick; put in shavings, kindling, coke and iron and start the fire; mud up the ladles and make little

balls of mud to stop the flow of iron when the ladle was full. I would get hold of the heavy end of the ladle and help carry, to pour the flasks. Then I would unclamp the flasks, drag the hot castings out of the steaming sand to the rattler and chipping department. I learned how to throw water on the sand and how to shovel it over a dozen times or so, until it would be tempered for a new start. And at the machinist's trade I could help lift the big shafts and threshing cylinders into the lathe; learned how to screw up the tail stock so it would go in the center; could put on the dog and could shift the belt so as to stop the lathe when it was running in the face plate while the boss was out to see if I had enough sand on the rock saw. I was drawing three dollars per week and boarding myself to learn all of that.

Then, being out of a job, the blacksmith next door offered me work. He said he would not cut down my wages, for I had worked some at the trade. It was surprising how much work we could do—the boss, a head blacksmith and myself. We would never turn a job away. We could have the shop full of horses and when another team came would tell the owner that we would do it soon and would put him ahead of some of the others. He would stay all day, just to think he was favored when he was not.

Well, the boss was making money and he got the side-line microbe. He started a livery barn. Of course he could not be in the shop much of the time on account of the new business, and there was a great change. We would get balled up with one team so we could not take on any more until after dinner. We would say "Can't do your work for quite a while. Got more than we can do till after dinner." So the work fell off quite a bit. But the boss blacksmith made a point to make his wages, so he would be sure of his money, but always figured not to make any for the boss. Sometimes he would run a little shy, but never run over much. In the two years I learned how to take off wagon wheels, roll them in the shop, knock off the tires, blow the bellows, pull down on the shrinker, carry shavings and wood to heat tires, could take out tire bolts and put them back, take off plow lays, cut threads on bolts, sweep out the shop, clean the mud off horses' feet, hold the twitch, knock the nails out of old shoes, lift off wagon boxes and hay racks, turn the grindstone for the wagonmaker, carry in coal, build fires, fill the slack tub and, in fact, do all things except real blacksmithing. It takes a long time to learn how to cut threads on a a bolt and take off a plow lay. Sometimes when there were no old bolts or nuts to pick up and thread he would let me take some old shoes and make some toe calk iron. But after he started the livery the blacksmith let me do most of the work for him, as it was much easier for him, and in the six months we held down the jobs I learned the blacksmith trade. What is the use of giving three to five years of your time to someone just so you can say you served your time as an apprentice? Some could work for forty years at the trade and still never be a blacksmith, while others in one year can skin them to death at the trade. Any man can learn to set a common tire in an hour, to sharpen a plow in a couple of days, can learn to weld iron in a day, cut threads, take off plow lays, carry in coal and all the above things with one application, so what is the use of taking off fifty thousand plow lays to learn how it is done?

Side lines may be all right, but all that I have tried seemed to be just the wrong thing. I tried the implement business, but found that the busy season for the side line and the main line was at the same time. A dozen farmers came in to get listers sharpened to go to work in the afternoon. After you start on them a farmer comes in to buy a lister. Now you have got to quit, show him the goods, talk all the good points to him, show him they are better than your competitors' stuff and give him two hours of your other customer's time. Your fire goes out and he goes up to see the other fellow's goods, while your dozen customers are cussing and waiting. How long can you do business if there is a shop in town that does work while you wait? You say hire a man. Now it's the same old story of profit.

Feed grinding is another great side line advanced for the smithy. I tried it and found that one can almost pay for the gasoline he uses if he doesn't count his time anything and doesn't run any nails through the grinder to break the burrs. The automobile is also booked as the blacksmith's business by right of being a mechanic. Well, you all know how the average farmer loves the joy-riders, and when the motorist comes for a repair he must have it at once, and motoring also comes when all other work is at its best. To drop everything in the shop and fix the car doesn't suit your farmer customers very well. I have heard so much about pocketing a great big fee from the autoists, but they must be different in other localities. I have never fixed an auto yet but that there was a big kick on the price and a yell of robber.

Side lines don't look good to me. If you have not got enough in the main line raise the price a little and put a little more energy in your main line, for you can't serve two masters at the same time.

Now I would like to ask some of the writers that give us a list of prices how they can make wages or a living under the present high prices when they put on four new shoes for ninety cents and sharpen plows at ten and fifteen cents? I should think they would require a half dozen side lines. Don't be pointed out as a Cheap John and have people say he doesn't know enough to charge for what he does. They will think you are a better mechanic if they are compelled to pay more.

J. B. Jewett, Nebraska.

A FAMILY OF WHICH ANY MAN MAY WELL BE PROUD. MR. CHARLES PAYNE AND HIS "HELPERS"

THE PENNSYLVANIA GENERAL SHOP RUN BY MR. CHARLES PAYNE AND HIS "HELPERS"

A Pennsylvania Smith's Family.—The engravings show my family and also my smith shop—there is only about one third of the shop showing. This is the shoeing shop; adjoining it is the wood shop, the lumber and stock building and a stable, all two stories. The three boys are mine, so there is some hope of the trade being in existence for some time. The boy with the horse's foot up is six years old, the next one, holding the horse, is four years old and the baby in my wife's arms is six months. I have a nice house and would like to have shown it all.

I am thirty-three years old and came to this country from Cornwall, England, seventeen years ago this fall. I went in this same shop, learned my trade, served four years as apprentice, was away five years and then came back, bought my uncle out, and I now own it, with money in the bank. This property is worth $3,000. I have worked hard, and do yet, and I think it's a good business for any young man to learn, but he mustn't be afraid of dirtying his hands and not be afraid of hard work. I believe the latter is one reason why there are not young fellows learning it. It means hard work and you must be there on the job all the time.

I enjoy reading "Our Journal," and find a great deal of good information. I am not prepared to criticize any one just now, but think there is a chance for all to learn. I find that by listening to some things our customers tell us in regard to certain work along our line we can profit by it, even if we do hate to be told. I do all kinds of general work, but a great deal of shoeing. I don't wish to brag as that is not my make-up—I let the other fellow do that: but I shod one day last winter alone, not a blow struck by anyone else, seventeen horses. I don't want to see another such day, for I will not work as hard again. I have no power yet, as there is a power shop here to do all my sawing and such work.

Charles Payne, Pennsylvania.

TIMELY TALKS WITH OUR SUBSCRIBERS

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like other blacksmith shop necessities are now sold through jobbers. Ask your jobber or his salesman about the ease and convenience of subscribing through him.

The following jobbers are now selling American Blacksmith Subscription Coupons (other jobbers will be named as soon as arrangements can be completed):

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Association Secretaries

Arrangements will also be made with the secretaries of the larger associations to handle American Blacksmith Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

Good Goods Cheap

If you purchased a gas engine, used it for a month or two, and then decided that it was not large enough for your growing business and you wanted to sell it—that engine, though used but a short time, would be second-hand. It may perhaps in reality be a better engine, for it has proved its worth and the few weeks running has taken the stiffness out of it, yet it is second-hand and you cannot expect to get as much for it as you paid. Suppose the same thing of any other machine, tool or item of equipment. You have to sell at somewhat less than you paid. It would enable the purchaser to secure a machine practically as good as new, at a real bargain price.

There are lots of such machines to be had—machines, tools and items of shop equipment that have proven too small for growing shops. You can learn of these real bargains through a wanted and for sale advertisement. If you want to save money, read and advertise in our want column. And the cost of such an advertisement is so small as to be almost nothing when compared with the number of shop owners who read "Our Journal."

Contents, November, 1911

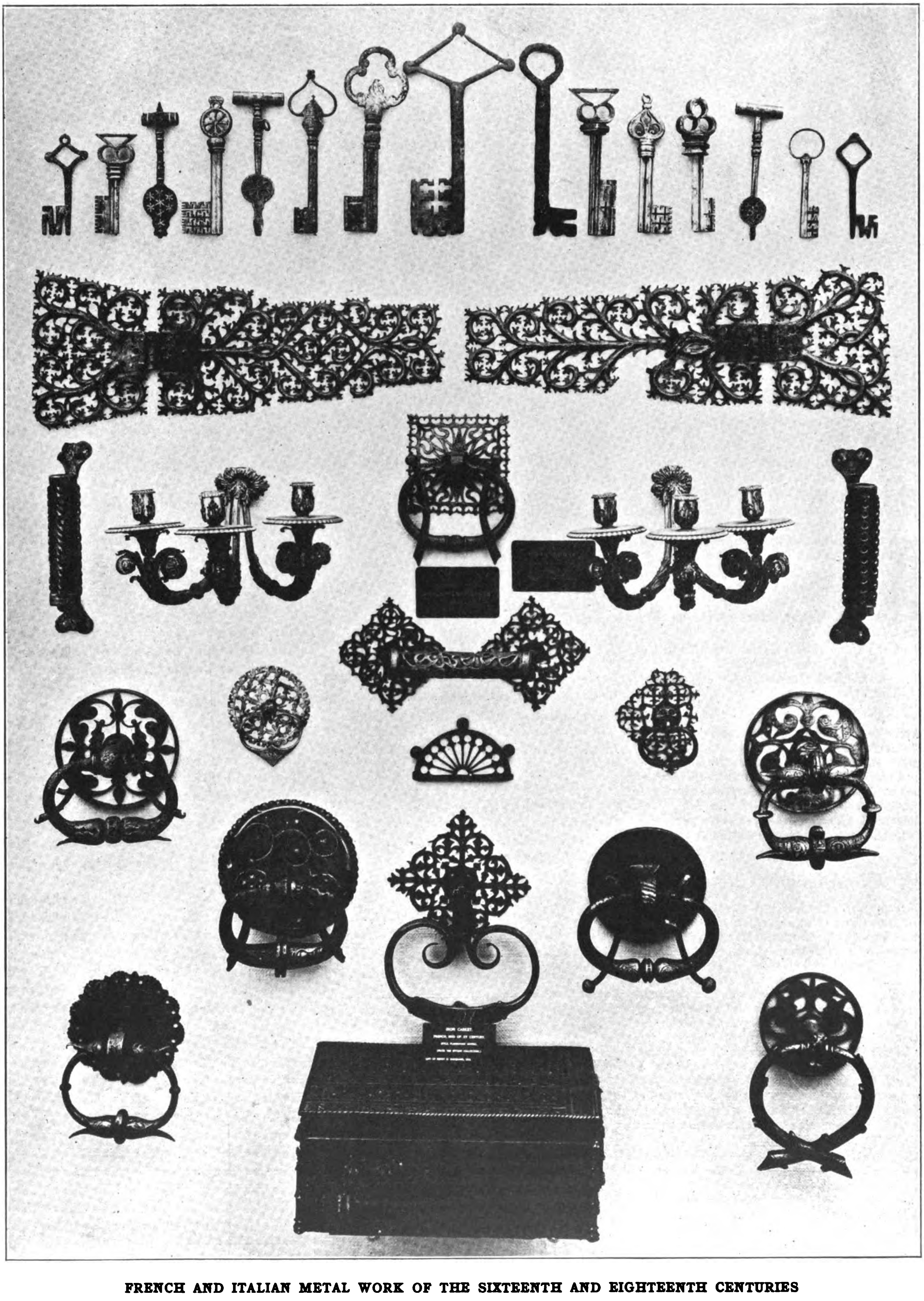
A Larger Family

Do you mention the American Blacksmith to other smiths whenever you get the opportunity? There's no reason why "Our Journal" shouldn't be read by at least fifty thousand smiths every month. And if each present reader would ask just one other smith we would soon have a mighty big family.

If your neighbor is not a subscriber, why not get his subscription order for a year? If "Our Journal" is of interest and value to you, there's no reason why it can't be to him. Tell him what the paper is doing for you and for the craft. Tell him about the good things you and your brothers get out of the paper every issue. Show the real brotherly feeling and call on your neighbor today—leave a copy of the paper and tell him we want his subscription order. And if you will do this and every other reader does it we'll soon have that fifty thousand and the larger family.

Changing Iron Into Gold

Did you ever look about your shop and consider the number of machines and tools that you are not using and which could with little trouble be turned into money? There are very few shops in which you cannot find something for which the owner has no further need and which is depreciating in value every day. Naturally the sooner items are sold, the more money you can ask for them. Why not dispose of these machines and tools?—Somebody can use them. If your business has outgrown these things, there are lots of shops into which just such equipment will fit exactly. And you will not find it hard to locate the owners of such shops if you place an advertisement in our wanted and for sale column. The cost is a mere trifle, and the results—well, there are some 25,000 smiths and more reading the paper every month. You should not have much difficulty in selling your machine or tool to some one in such an audience.



FRENCH AND ITALIAN METAL WORK OF THE SIXTEENTH AND EIGHTEENTH CENTURIES

Some Early Metal Work

Examples of Sixteenth Century Smithing Art

IRON has been utilized and turned to account for, in round numbers, about 5,000 years. To attempt to tell how it was produced in earlier times would be impossible, as the information that has come to us across the centuries is very incomplete, and then, too, there is much disagreement among experts and others regarding the methods used by the ancients. It is known, however, that iron was produced and used at a very ancient date, and its beginning as a metal certainly dates back to prehistoric times. There are in the museums of Europe pieces of iron tools, weapons and implements that in some instances have been proved to have their origin some 4,000 and more years ago. The excavations uncovering the cities of ancient times have brought to light all manner of articles of iron,—even unwrought ingots weighing hundreds of pounds.

The engravings on our pages this month show examples of the iron work of the smith and founder of the 16th, 17th and 18th Centuries.

Founding or casting was unknown until the renaissance period and was then limited almost exclusively to the casting of fire backs and stove plates. It will be noticed that the fire back in the middle of the three shown is dated 1677. The one at the left is evidently a later production, judging from its smoother and more finished appearance. In comparison with the hand wrought work of the same period, or even earlier work, it can be easily seen that the work of the smith was smoother, cleaner and in every way superior to that of the founder.

In Fig. 2 are shown several articles of early German make. The three long pieces are gridirons. The five powder horns and the single spur can be recognized by their shape. These articles show no very great degree of skill on the part of the forger, though the powder horns being hollow may puzzle even the smith of today, in the making. The finish of all of these articles is exceptionally smooth and their design was undoubtedly considered excellent in their day.

In the next engraving, Fig. 3, is shown a door knocker and two fireside cranes. The knocker shows some good work with the chisel or scoring tool, the feathers on the bird-like figure being represented by indentations. The cranes show no particular degree of skill, though these articles of utility certainly offered excellent opportunities for rich embellishment. These cranes, as the reader undoubtedly knows, were hinged to one side of the open fire place, and from them was suspended the "singing kettle" of which the poet speaks. The cranes were arranged so as to permit the kettle to be swung over the blazing logs or out into the room.

The candlesticks of the 17th and 18th Centuries, in Fig. 4, are German productions. They show not so

FIG. 1—FIRE BACKS WERE THE FIRST ARTICLES OF USE THAT WERE CAST IN IRON

much a skill in design and workmanship as they do ingenuity in arrangement. The various devices for raising the candle as it burns down and for raising and lowering the light itself are certainly ingenious. The arrangement for holding the candle at any height within the range of the support rod is certainly very practicable. The next candlestick showing a spiral arrangement for raising the candle as it burns away is quite ingenious. The third stick in the bottom row is similar in arrangement. Other candlesticks, it will be noted, depend upon a spring-like rod for holding the candle. In all of the sticks shown it is quite apparent that the housewife of the 17th Century was very much afraid of littering her floors with candle drippings—the catch pans were made excessively large.

The andirons in Fig. 5 show a greater skill in forging than any of the examples shown so far. There is also more effort at real design. The andirons at the right in the engraving are excellent examples of early ironwork, and we can readily picture these old firedogs sturdily supporting a huge log in one of the old time fireplaces that were almost the size of some present day rooms.

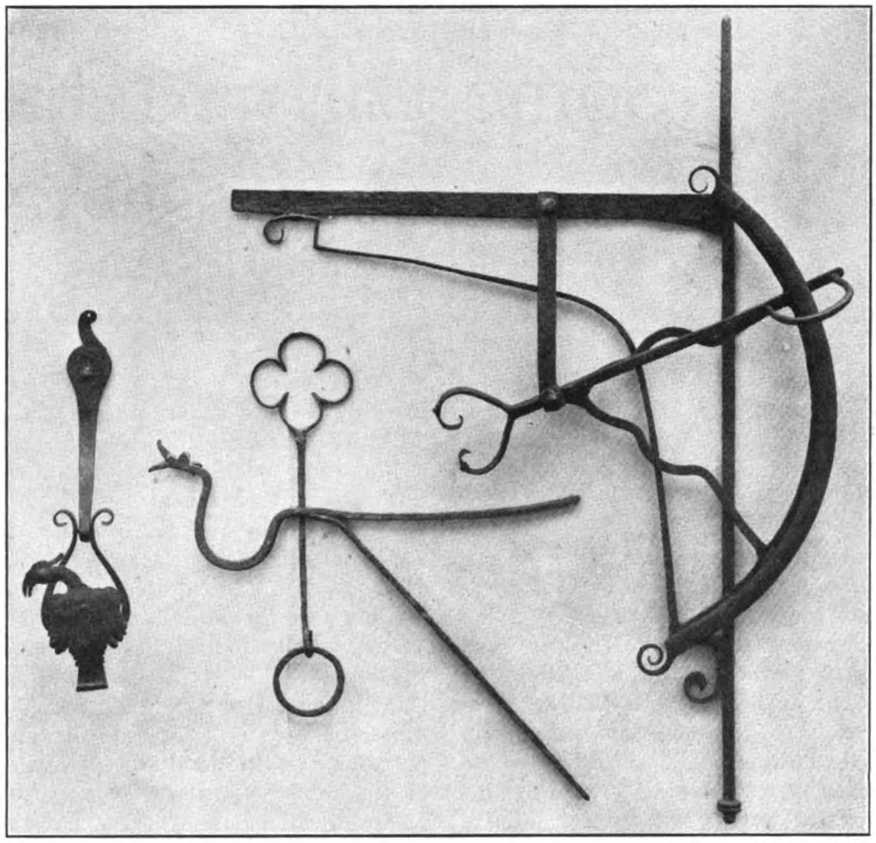


FIG. 3—HERE ARE A DOOR KNOCKER AND TWO FIRE CRANES

Fig. 6 illustrates a piece of Italian ironwork of the 16th Century. This grill shows exceptional workmanship. The design is very good. The Italian designer's work is generally simpler than shown here, though the center portion of this grill is more like the Italian style. By looking closely at this piece you will note that the maker was quite expert at welding.

Several examples of metalwork that the smith of today will find difficult to imitate are shown in

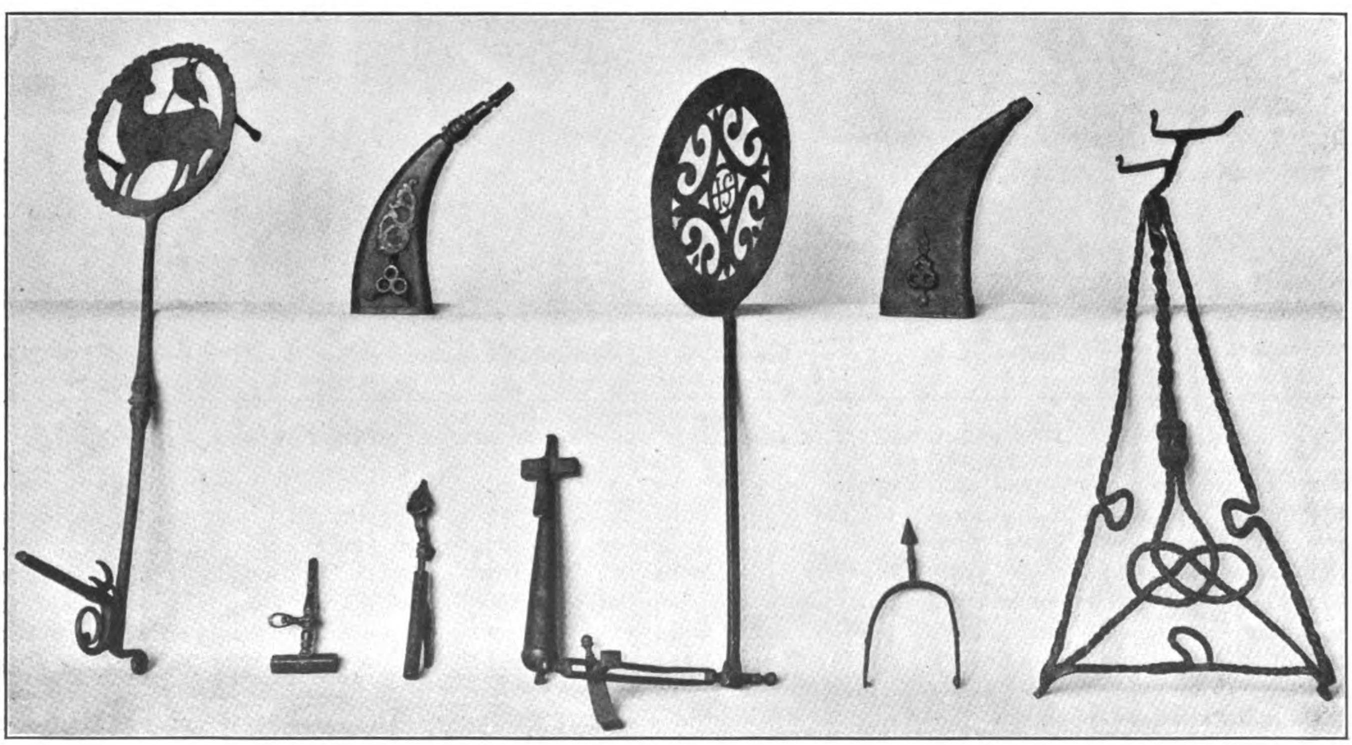


FIG. 2—THESE PIECES ARE OF GERMAN MAKE. THEY COMPRISE POWDER HORNS, GRIDIRONS AND A SPUR

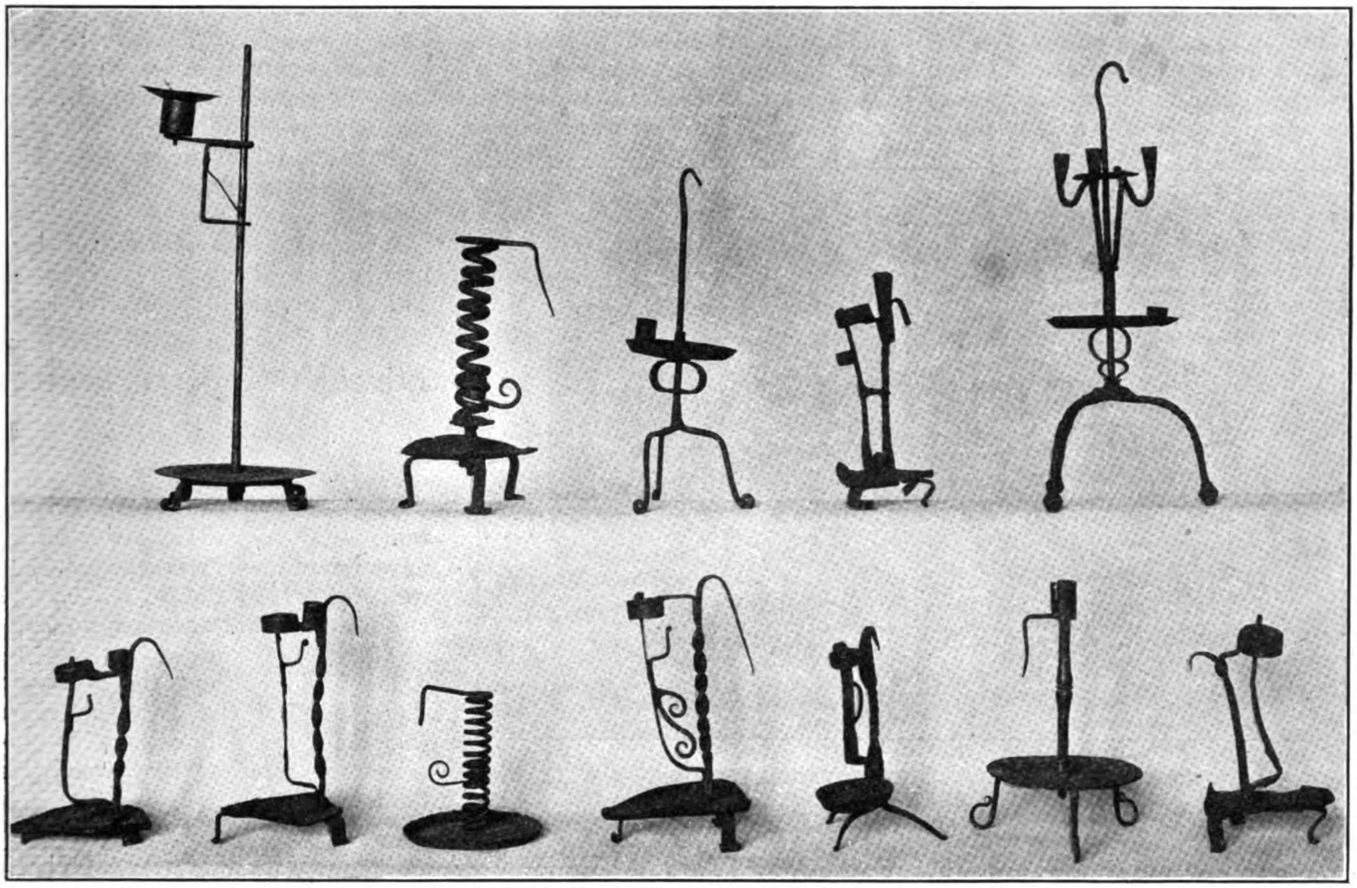


FIG. 4—A COLLECTION OF SEVENTEENTH CENTURY CANDLESTICKS SHOWING INGENIOUS MECHANICAL FEATURES

the frontispiece. Here we have examples of French and Italian work of the 16th and 18th Centuries. The keys at the top show some difficult forging. They range in size from about five inches in length to ten inches, which is the length of the center key. The two hinges below the row of keys are excellent in design, style and workmanship and, while they are highly ornamented, the neatness of the design offsets this considerably. The doorpull in the center just below the hinges is also excellent in design, and especially is this true of the base plate, showing an exceptionally pleasing latticework effect. The candelabra at either side of the doorpull appear more like the work of the expert founder than that of the smith. The piece below the small card in the center of engraving is another doorpull and is very good both in design and finish. A smaller pull is shown at either side just below this and both are good. The other doorpulls are good to greater or less degree—some having the appearance of being castings.

The iron casket at the bottom of the engraving is about fourteen inches long by about six inches high. It is ornamented with various designs and shows exceptional ability on the part of the maker.

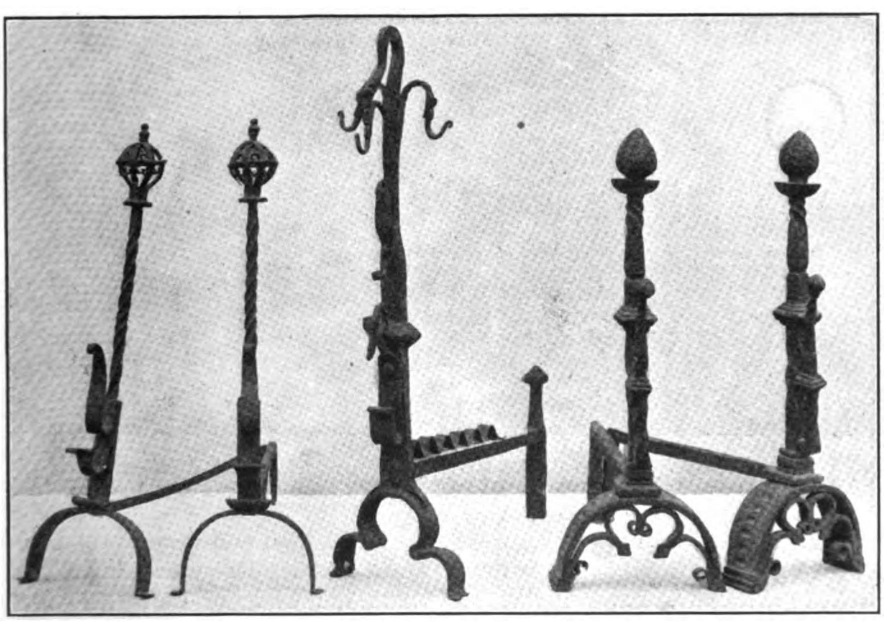


FIG. 5—SEVERAL WELL DESIGNED ANDIRONS NEATLY FORGED

A Unique Ink Stand, Hand Forged

BERT HILLYER

The accompanying engravings show a front and side view of the piece. The bird is hollow, to hold the ink. The stock from which it is made is $\frac{1}{4}$-inch soft steel, hammered down to less than $\frac{1}{16}$-inch

thick and 2⅞ inches long and is forged from one piece.

The snake is forged solid, and coiled so that it forms the base of the stand, while the coils make a handy place in which to lay the pen. The snake before coiling was about 16 inches long and made of ⅝-inch round iron. It is very easily made.

The bird is more difficult to make, but not as difficult as is at first imagined. To make the bird:—make a stamp of ⅛-inch sheet-iron for the wings. This is done by doubling up the ⅛-inch sheet-iron, and drilling a ¾-inch hole from where it starts to double at the bottom. A hacksaw is used to cut the rest of the wing to shape, which should first be marked off. A small recess is also filed or cut out for the head. The piece is then heated and bent flat again, as shown by dotted lines at A. We now have two perfect wings, both exactly alike. Next take a piece of ¼-inch sheet steel, about 3½ inches wide, and heat to a good red. Place stamp over it and pound impression in so that it is raised on bottom piece ⅛ inch high. Now trace form of bird as at B and then cut out as dotted lines indicate, following around outside part of wings. With the hacksaw split wings down as shown at C. These, when thrown back, allow all parts to be worked down thin and trued up to shape. With two pair of close tongs (one on each side) bend the body part in, and with light, careful taps it can be shaped up nicely. The head is cut out wide in the beginning, so that when hammered edgewise it increases in thickness, this part being solid. Where the two sides meet at the breast it is best to braze, as this is almost too delicate to weld. A thin cold chisel marks the feathers on wings and tail and a very small stamp raises feathers on body and butt of wings.

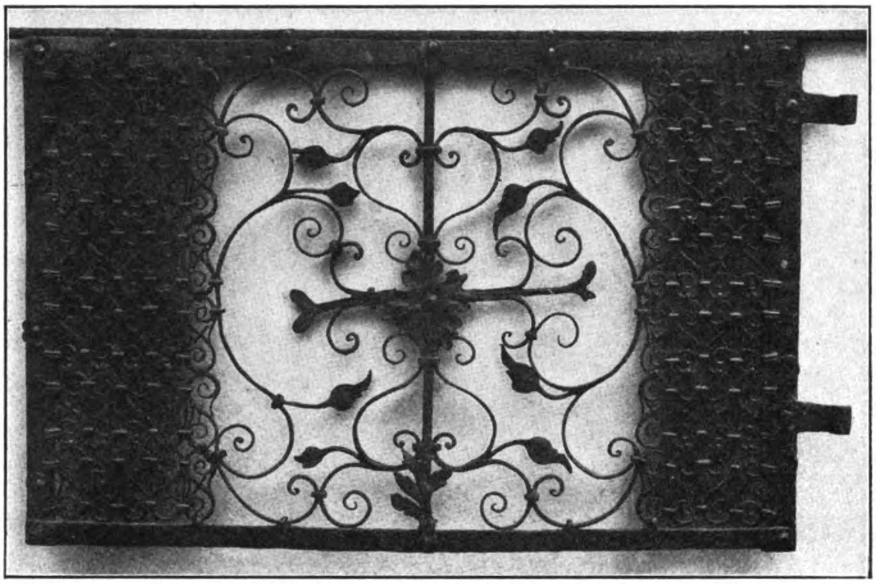


FIG. 6—AN ITALIAN GRILL OF THE SIXTEENTH CENTURY—A WELL FORGED PIECE

The snake was drawn down tapering, as at D, the head being shaped and split down with a hacksaw and the end of the top jaw drawn down to a sharp point which, when turned in, makes a fang. It is next marked with a stamp similar to that used on the bird, only larger. After this it is coiled and the jaws tightened over the bird so that they hold it securely. The whole piece is then heated to a very low black heat, dipped in linseed oil and pulled out with enough heat in the steel to bake the oil on the surface. This when correctly done makes a nice glossy finish.

When the bird is completed, a hole is drilled in the top of the back and a cap made to fit this hole.

New York State Smiths Raise Prices

H. L. Griswold

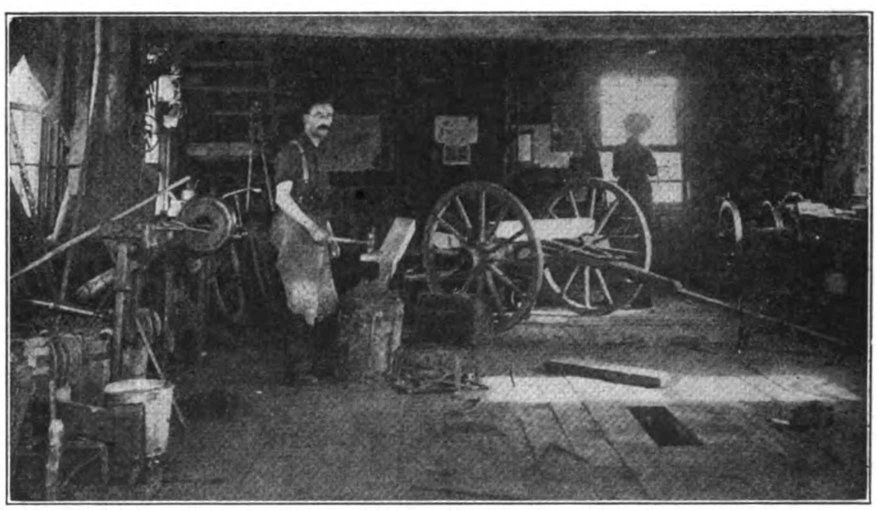
The blacksmiths of Naples, Bristol, Ingleside and North Cohocton, N. Y., have raised their prices for shoeing work from 12½ and 25 cents to 15 and 30 cents and on other work accordingly.

They will cut out the Neverslip shoes, because the local hardware companies are selling them to outsiders the same as they would to the trade.

A Giant Beam Trawl

M. F. Shea

This beam trawl was built for Captain George F. Cottrell by myself as a test of the adaptability of this form of fishing gear for large vessels. There were beam trawls in use, but they were generally of 30-feet length of beam with a shoe about 3 feet long by 2 feet high and were worked from small vessels. This was built to determine the value of the tackle for a large vessel, and the George Hudson, a fishing steamer of 149 tons and 130



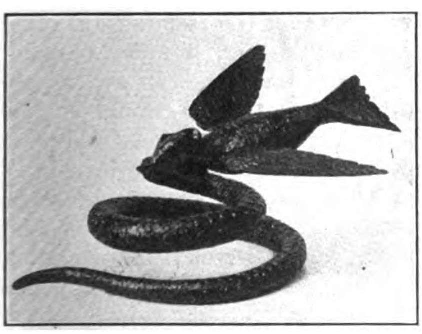
THIS IS MR. GARNET E. ROWE'S CANADIAN SHOP. HE EMPLOYS A GAS ENGINE

feet in length, was selected to try the trawl.

There needed to be some engineering and calculating before the trawl was ready for use. It was 60 feet long

MR. HILLYER'S UNIQUE INKSTAND

between shoes or runners; the shoes were a trifle over 6 feet high and 7 feet long. They were of iron, 5 inches wide by an inch thick, except on the bottom, where they were 7 inches wide and an inch and a quarter thick. The beam connecting the two shoes was made of two pieces of timber, jointed. This was merely to keep the shoes apart, the strength being given by an iron truss. This truss was formed by four iron rods, each an inch in diameter and bridged from the beam by wooden discs, which in the middle made the iron stand a foot from the beam on either side. The rods were bolted at either end, making



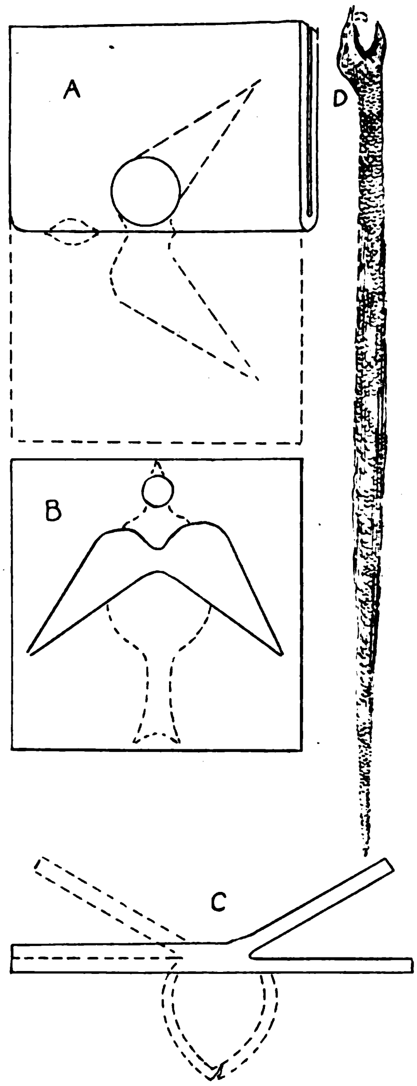
THE BIRD IS FORGED HOLLOW

the truss firm and the entire outfit strong and fit to stand the strains it must undergo in the fishing business.

How I Built a Spark-Proof Furnace for Heating Tires

A. S. M'ARTHUR

In the matter of setting heavy tires I was in a quandary for several years for some way of heating them without endangering the town from open fires. In the spring of 1910 I studied out and built a brick furnace which I have since used with great satisfaction. Thinking that a picture and description of it might be interesting to your readers I submit the following:



HOW TO FORGE THE SNAKE AND BIRD INKSTAND

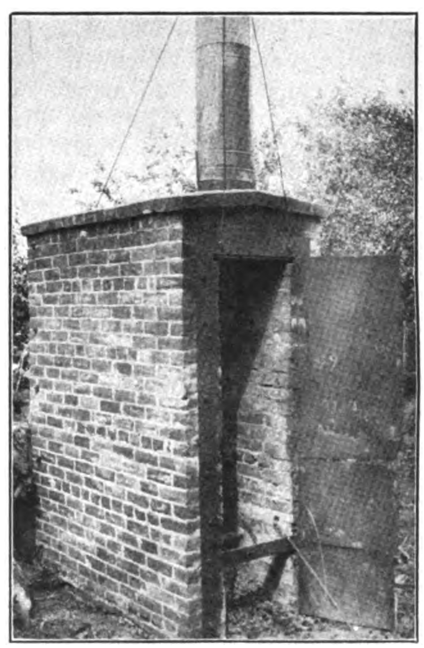
Foundation, cement; furnace, 29 rows of brick; ash space, 5 rows; fire space, 20 rows; top deck, 2 rows; roof, 2 rows. The inside is 18 inches wide and takes a tire 4 feet 9 inches in height. Built in with the fifth row of brick are two heavy iron crossbars for the tires to rest on. Level with the top of the doorway are four or five flat iron crossbars on which rests a piece of sheet iron fitted neatly to the brick in width and extending from the front to within eight inches of the back of the furnace. This forms a top deck or baffle in the draft where all the sparks fall; they do not make the second turn. The smoke has to enter the top deck at the back and come forward to the front before going up the chimney.

On top of the twenty-seventh row of bricks are built in five or six flat iron bars or rafters, crowning about two inches. These are overlaid with sheet iron (except the opening for the chimney) and covered with a row of brick. On this row is set the base for the chimney. Then the last row of brick is laid, projecting all around for appearance, and the water-drip finished over all with a good coat of cement, which leaves the roof waterproof.

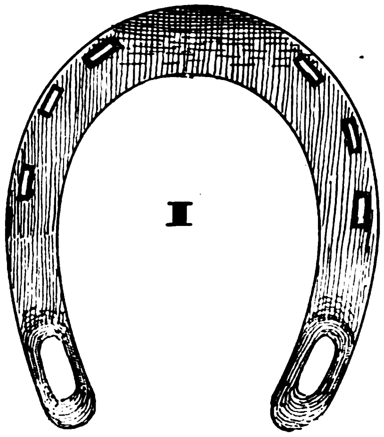
The chimney is 12 inches in diameter and 6 feet high, stayed with three guy wires, as seen in the illustration.

The door frame is 4-inch bandiron. The top corners are held firmly by back plate riveted across the joint. Level with the bottom of the tire space is a 2 by ½-inch iron riveted firmly to the back of the frame. The three doors are made of No. 12 gauge sheet iron and are 21 inches wide, lapping 1½ inches on the brick wall, hinged with butt hinges, put on with ¼-flathead stove bolts, countersunk inside, nuts on outside. The top door is swung on three hinges. The doors are hinged, latched and all completed before attaching the frame to the furnace.

The chimney base is made of 12-gauge sheet iron, bent to an oval,



A SPARK-PROOF FURNACE FOR HEATING TIRES



I

MR. SAMSON'S SHOE FOR PREVENTING FORGING

edges meeting even and held by inside plate and countersunk bolt, nuts inside. One end is split up 1½ inches, about every 1½ inches all around. These split pieces are then bent out to a square, open at top and set in place. The last row of brick is built on top of this flange, holding it firmly in place. The chimney pipe is common galvanized iron, two lengths.

In the doorway is seen an iron poker with a special hook on the end. I open the second door and if the tires are heating too much in one place I grip the edges with this hook and pull them around. I do not need, therefore, to open the top door until I want to take out a tire. I find, too, that this method requires only half the fuel.

As reinforcement for the brickwork I had 14 stay-irons placed in the wall lengthways and four or five crossways at the back end.

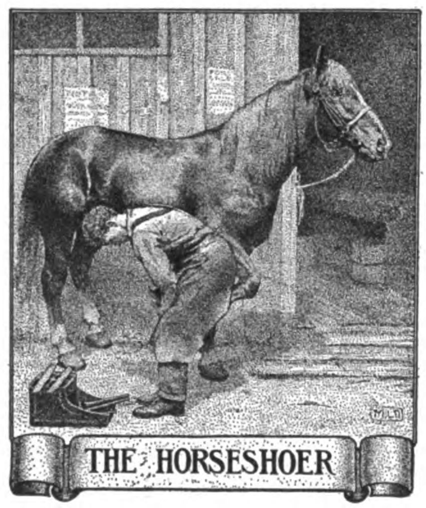
Long stay-irons are made of old steel buggy tire, rounded up and threaded to a half inch at one end and 1-inch square bend at the other end to hold against the brick. The short stay-irons are ⅜ inch round, with a washer and nut on each end.

To begin building, the first thing needed is a false door frame. Use 1-inch board, 7 inches wide, make it the same width inside as furnace, that is, 18 inches, and place it in position where you wish the front of the furnace, plumb it both ways and stay it firmly with a brace at the top. Then build the brickwork to it. As you work up and want to use a stay-iron, bore a $\frac{9}{16}$-inch hole where needed and run the threaded end of the iron through this hole until the hook at the other end comes against the brick, and so on until finished. Then remove your false frame intact, lay it evenly on top of your iron frame and mark all those holes on your iron frame. Then bore those holes ⅝ of an inch. Now place your frame into your furnace, screw up the nuts, and your frame and doors are all held solid and firmly, and the furnace is ready for use. In fitting the doors to the frame leave a good ⅛ inch between the doors for expansion, and also ⅛ inch between the door and the frame.

No. 12 gauge iron can be purchased in sheets of 30 by 72 inches from any hardware dealer. One sheet being all that is necessary for a furnace.

The brick used was ordinary good, hard building brick. Should I build another furnace, however, I would allow four rows of brick for the ash space and three rows for the top deck.

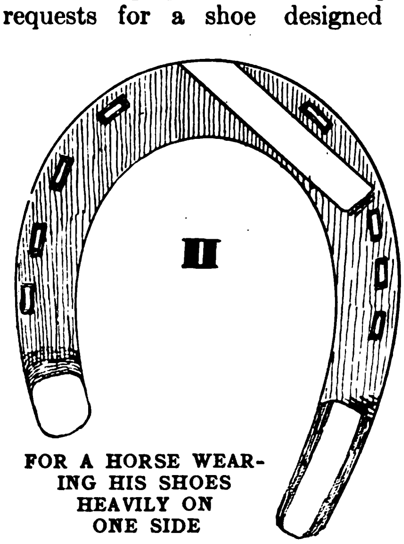
My furnace, counting my own time, cost me about $25.



Several Practical Shoes

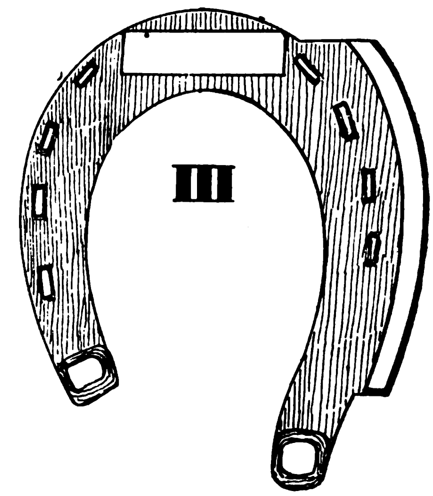
I. F. Samson

The accompanying engraving, Fig. 1, shows a good shoe for the prevention of forging. There are frequent requests for a shoe designed for this special purpose and I believe this one will prove to be correct in design. I have used this shoe extensively and have obtained good results. I find that rolling the toe causes the horse to break over quicker. This style of shoe is also very good for an animal that is inclined to stumble. The shoe as pictured is for the front foot and should be reasonably heavy. For the hind foot I would advise using a light shoe with a toe calk. It is important, however, that you make the heel calks no lighter than the toe calk.



II

FOR A HORSE WEARING HIS SHOES HEAVILY ON ONE SIDE



III

A HAND MADE SHOE FOR THE HORSE WEARING HEAVILY ON ONE SIDE

Mr. W. E. Murchison of Georgia asks how to shoe a horse that wears out his hind shoes on the outside in from 15 to 20 days. If Brother Murchison will try either of the shoes shown in Figs. 2 and 3 I think he will obtain the results he is after. The shoe in Fig. 3 must be hand forged and unless he can get a good price for his work I would suggest he use the shoe in Fig. 2, as he can use a machine-made shoe for Fig. 2.

If any of the readers of "Our Journal" try my plan of shoeing forging horses I would be pleased to hear from them through these pages.

Horseshoeing Shops and Supplies in the Far East

Some Interesting Items Taken From the Consular and Trade Reports

China

Horseshoeing and blacksmithing are two distinct trades in China. The tools used in horseshoeing establishments of Shanghai are foreign hammers and rasps, and all other

A GENERAL SHOP OF NORTH CAROLINA RUN BY MR. A. L. JONES

implements and supplies, including the shoes and nails, are homemade. In the native cities the tools, shoes, etc., are usually all of home manufacture and are somewhat clumsy. Large quantities of old horseshoes are imported and, on account of their temper, are made up into tools used by the native city workmen. The horseshoes used in Shanghai (the English style) are made from bar iron of the proper size. Nails are made from a small strip of iron. The greater part of the iron is probably American, reaching Shanghai via Hongkong and Japan. The tools used in the blacksmith shops in the foreign section are, for the most part, homemade, and such as are commonly found in similar establishments in the United States. In their native city the blacksmiths manufacture crude knives during their leisure time.

Considering the antiquity of horseshoeing in China and its general practice it has not been highly developed. All tools and appliances are of the simplest kind. The smith makes in his shop from scrap iron the shoes he uses. Those ordinarily in use by the Chinese differ from the common American shoe in having the heel part considerably longer, so that it may be bent up over the heel of the hoof. They are also very much lighter in weight. With the advent of foreigners, considerable improvement in the methods of shoeing have been made in many places and the heavy Western shoes

MR. JONES DOES IRON AND WOOD WORK OF ALL KINDS

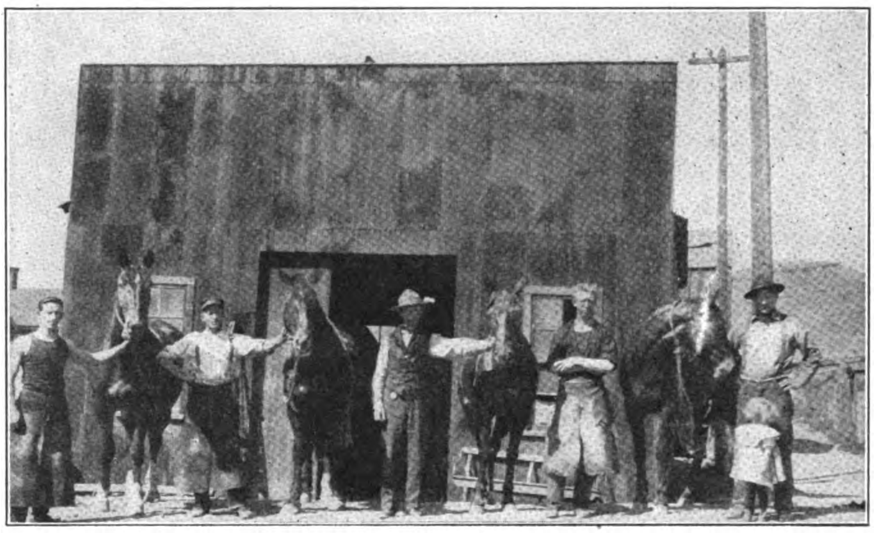
introduced, so that at practically any of the treaty ports it is now possible to have a pony shod more or less after the Western fashion. Nails are imported from Europe and the United States. Scrap iron is also imported to a certain extent and is transported very largely from one Chinese port to another.

The tools used in Amoy are of the simplest character and are very crude. The tools, shoes and nails are made locally. Iron shoes are employed in the north, but in this district where horses are little used they are usually left unshod, though the forefeet are often covered with leather shoes which fit the hoof. The tendency now seems to be to

tools are found. The fire-place with its Chinese handworked bellows takes up a great part of the shop. A steel anvil and a drilling machine of German make, for hand power, are the only larger tools used. There is the usual supply of hammers, files, rasps, tongs and hoof cutters. All iron and tools used are imported from Germany, and all horseshoes are made locally by the blacksmiths. Japanese coal is used for firing, and American, Manchurian and Japanese wood is used for all woodwork.

Japan

The blacksmith shops in Yokohama are usually divided into two parts, the foundry and the shop for



A BUSY HOUR AT MR. CHARLES JOHNSON'S SHOP, OF WYOMING

put iron shoes on the forefeet instead of leather, but the change is not practiced to any considerable extent.

The tools in use in Chefoo are all homemade, including hammers, pinchers, knives, shoes, nails, etc.,—very crude, clumsy and heavy. The material for shoes is obtained by the importation of old horseshoes from Mongolia. Nails similar to the style used in the United States are made from the scraps. Most of the material used by the smiths is imported from Europe and America in the shape of old iron and horseshoes. The smiths make knives, tools and all sorts of cutting instruments in their leisure hours.

The two German-owned horseshoeing shops in Tsingtau do not show any special deviation from those in Europe or the United States. There are no Chinese-owned shops in this colony. Only the ordinary

shoeing proper. The tools used in forging shoes are anvils, hammers, hammer stands, fuel boxes, fire shovels, extinguishing pots, large and small fire sticks, iron cutters, grooving chisels, chisels for nailholes, vises and rasps and files of various sorts. The tools used for actual shoeing are hammers, cutting hammers, hoof cutters, hoof-cutting knives, nail cutters, wooden stands, and saws. Ordinary shoes are classified into six different sizes. They are in most cases manufactured by the farriers who shoe horses. Wrought iron and steel are used as material of shoes and fittings and they are imported from foreign countries. Nails are also imported, and the American products are highly spoken of. Coal, coke and charcoal are used, most of which are obtained in Japan.

Few horses are used in the Nagasaki district, and there are in

consequence no regular horseshoeing shops. The few horses used here for hauling carts, etc., are shod with straw sandals, which are tied to the hoofs and cost about 5 cents per set. The few riding horses are shod by some blacksmith who copies, as nearly as possible, the shoes formerly worn or some English make of shoe. Nails and iron are supplied by the United States and England.

The tools which the Korean blacksmiths use are of the simplest sort--hammers, pinchers and nippers, and a hand anvil to bend down the end of the nails. These tools are poorly tempered instruments of Korean manufacture. The shoes and nails are roughly fashioned by Korean blacksmiths from Chinese or Korean iron, and are finished off by the horseshoers in their spare time. Coal and charcoal are usually of Korean production, although they are in some cases imported from Japan.

Siberia

Of the 381 blacksmith shops throughout the Maritime Province none are more than mere shacks. The tools used are the simple appliances employed by blacksmiths, and are principally of German manufacture. Shoes, nails and iron are imported from Germany and European Russia, principally the former. Usually the finished shoe is imported, and comparatively few shoes are made here. A few American and British shoes and nails have been imported, but the quantity is so small that with the possible exception of a few horses at the race track none are shod with these materials. Shoes are put on cold, and it is not uncommon to see a blacksmith spring a shoe on the hoof in order to make it fit.

India

In the Madras district of India a horseshoeing establishment is constructed solely for that purpose, and has no other workshop attached. The tools used in the better class of shops embrace the following: Anvil, tongs, iron cutter, hammers, pinchers, punch, pritchel, heel cutters, fullers, vise, files, buffer, rasp and shoeing and drawing knife. Supplies for shoeing are obtained from ironmongers in the bazaars. Shoes are made by the best farriers from imported iron, though ready-made shoes are to be had in the market. The latter are of inferior iron, make, and finish, and are used mostly by the cheaper native farriers, who travel around with a supply of them, working on their own account and picking up jobs of cold shoeing whereever they can. The nails used here are of English manufacture generally. No coal is ever used, charcoal of local manufacture being the heating material used in hot shoeing.

A BLACKSMITH SHOP OF SAN SALVADOR

This shop is in the capital of the island where the white man first set foot on the Western Hemisphere. The shop is really a foundry and a smith shop combined. Before the shop is one of the modern motor cars used by the President of San Salvador.

All horseshoes in Bombay are locally made from imported Swedish iron, which must be of good quality in order to stand the hammering out and fitting cold. The anvil used is a very small one, and the tools consist of hammers, pinchers, drawing knives, rasps and buffers, the latter being hatchet shaped at both ends. Shoeing supplies all come from England, from which the Swedish iron and nails are secured. Indian coal is generally used. The work of repairing conveyances is a business entirely independent of that of horseshoeing. The average native would be quite incapable of learning both trades.

The vast majority of farriers in the Karachi district are extremely inexperienced. The average native workman carries his shop with him. Shoes are fitted cold, or rather the hoof is prepared to fit a shoe already in their possession. These men will furnish new shoes and put them on for 20 to 24 cents. Their charge is 12 cents per set for old shoes. There are several men in Karachi who conduct business more or less on the lines of the American farrier; their shops comparing favorably with those in the United States. While hammers are generally imported, most of the other tools are made by the practitioner himself. Shoes are made by the farrier from mild steel bars which cost about 1.67 cents per pound. Nails are imported from England through Bombay, costing 12 cents per pound. The ordinary shoe is simply a plate fitted to the hoof, with holes punched for the nails. The shoe is not grooved; consequently the nails protrude about a quarter of an inch above the shoe.

There are scarcely any workshops in the Rangoon section, a horseshoer wandering from one stable to another picking up an odd job at shoeing. Most of the tools are made locally, although files and hammers are imported. Shoes are imported in small quantities from England. Most of the shoes are made by hand from iron imported from England and Sweden. English coal is also used. Some American nails have been used, but most of those imported are English.

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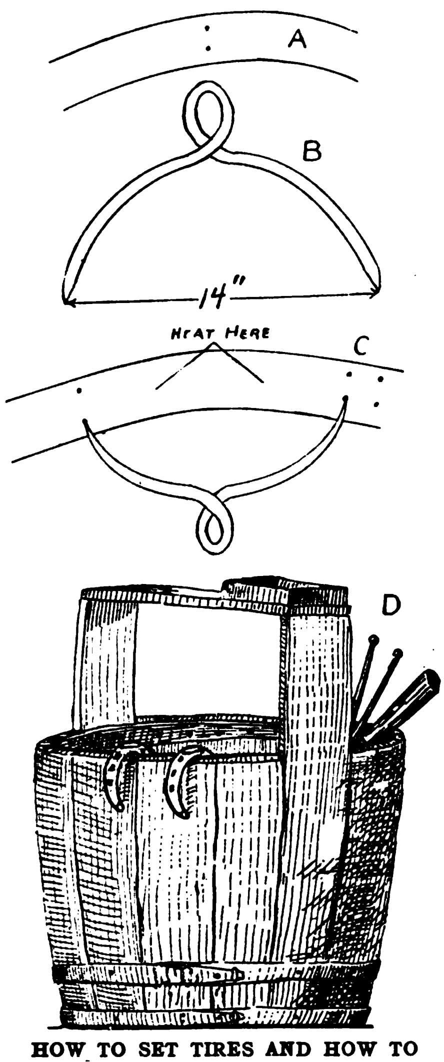
How to Set a Tire the Old Way

F. L. Davis

I see lots of talk about the cold tire setter, pro and con. I learned but one way of setting them and that is the old way; but I honestly believe that I can do a better job the old way than the new. I cannot see how some of the brothers get their

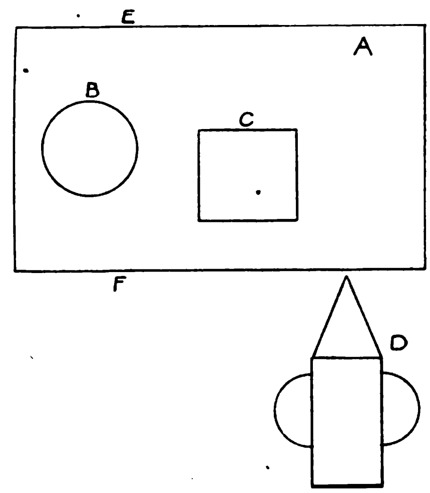


HOW TO SET TIRES AND HOW TO BUILD A SERVICEABLE SHOEING BOX

tires right by shrinking them and then cooling them off before running the tracing wheel over them. I may be mistaken in thinking I know a quicker process, but I venture to give it in full, as it may benefit some brother smith. When I take the tire off the wheel I wedge all the spokes solid in the felloes and allow for a wheel that has sufficient dish—about ⅛-inch clearance between the last two felloes. This will give the tire a chance to tighten the spokes in the hub and still hold plenty of dish. I then surface the part of rim next to the tire, cutting off all tenons that stick above it. At the same time I scrape all the old rust and dirt off the felloes with an old rasp. I place the wheel in position to measure, but before doing so I take the largest blade in my penknife and stick it between the two felloes in which I left the clearance. I next measure the wheel and set it to one side. I take the tire that came off the wheel, stand it up on the anvil and proceed at once to knock all the dirt and rust scale off. After it is cleaned I measure it and find how much larger it is than the wheel. I set the tire against the anvil and, with a center punch, punch two holes, as at A. I next use a pair of calipers which I made from an old hay rake tooth, as shown at B. They are sharpened enough at both points to make a scratch mark. I then put one point in one of the punch holes and scratch a mark on the tire with the other point. I then mark as far around the tire beyond this mark as the tire is too large, together with what draw I wish to allow. Here I punch two other marks. That tire is now ready for the shrinker. I shrink the tire, keeping it as near round and straight as possible, until my rake t[illegible] caliper points lack $\frac{1}{16}$ of an i[illegible] of being in my punch marks. [illegible] your tire when cold will be [illegible] what you planned to have it. [illegible] will bet I can set them in that [illegible]nd guarantee them to be good for twelve months. The hot tire setting is good enough for me, though I am not saying I never intend using a cold setter.

A Handy Shoeing Box from a Shoe Keg

I will tell you of a horseshoeing box I made from an old horseshoe keg which anyone can make in a short time. About 7 inches up from the bottom (outside measure) I sawed off all the staves excepting two opposite each other. These two I then sawed off about 15 inches from the bottom (outside measure), and between the two I nailed a piece of board, ½ by 3 inches. Next, taking the hoop that came off the top of the keg, I placed it inside of my box and found it came just even with the top edges of the keg as I sawed it off. Near one end of the cross piece I tacked a small shallow tin can to hold horse nails. The edge of the box is used for hanging shoes on and inside is ample room for nippers,



HOW TO WELD THIN TIRES EASILY AND QUICKLY

hammers, rasps and all other tools necessary for shoeing a horse. The same box will come in very handy for anyone who has a job to do away from the shop, as it will be found to hold a large number of tools and extras and can be made to look attractive with a little paint.

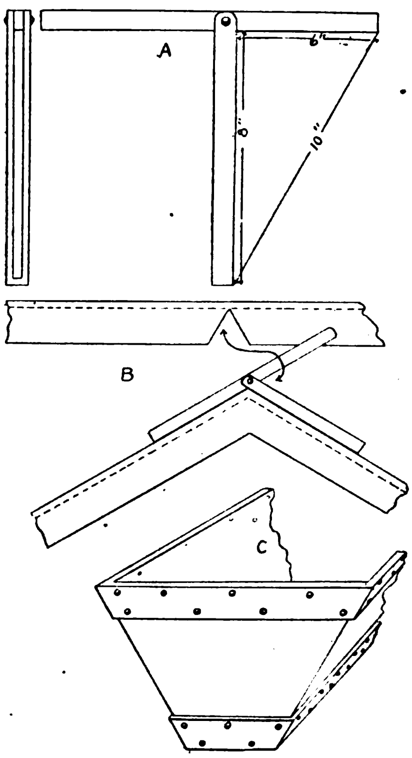
How to Weld Thin Tires Easily and Quickly

J. L. H. Mosier

To weld thin steel tires perfectly is not quite as easy a performance as may be imagined. The writer in his sixty years in the smith shop has tried many, or did try a great many, methods before he hit on the one he will now explain. We used crucible cast steel only, the lower grade, that is, the softer quality. The sizes were in width ⅝, $\frac{11}{16}$, ¾, $\frac{13}{16}$, ⅞ and 1 inch; the thicknesses were $\frac{1}{16}$, $\frac{3}{32}$, ⅛ and $\frac{5}{32}$ inch. These were called "the light sizes." It would be neither instructive nor entertaining to relate or illustrate the methods that were tried and found wanting, or, in other words, valueless.

My first procedure was to fit a forge especially for my purpose. I took two bellows poles and united them at the fulcrum or lever pin, so that the helper could stand at the opposite side of the forge from me

and manipulate the bellows while I manipulated the heat. I first prepared the points for welding by upsetting enough to make up for waste. I then punched a small hole to take a No. 6 blank steel screw, by which means I secured the points.



THE BEVEL IS A VERY USEFUL AND NECESSARY SMITH SHOP TOOL

Now, referring to the engraving: A represents a top plan of the forge; B is the tuyere; D the anvil; E the helper; F the smith; C a good, heavy piece of iron just in front of the tuyere. This iron I heated up to about 250 degrees. I then warmed the tire, put in the flux and raised the heat. When ready, the helper assisted in removing the tire to the piece C, where I welded the tire on the flat only. I did no edging with the hammer. After welding I placed the tire in the fire and heated enough to remove the flux and oxide (scale) with a worn file. Then with a hand cold chisel I removed the flash on each edge and reheated and finished the edges with an old mill file. I cannot recall a single instance in the many welds made by myself (and the thousands made by those whom I taught the easy trick) in which there was a faulty weld. I owed success to the hot welding block on the forge—the position of the helper at the forge. The main point is in not attempting to work on the edges. To those who have doubts I would most respectfully suggest that they follow the suggestions here set forth and convince themselves of the wisdom and facility of this method. The rule also applies to the welding of other pieces beside tires and steel.

How to Use a Bevel in the Smith Shop

Bert Hillyer

A necessary tool in the smith shop is the bevel. Some of its uses I will try to show.

The easiest and simplest way to make a bevel is to take a piece of 1/8 by 1-inch steel, 18 inches long. Round the two ends and bend in center so that when doubled there will be a space of 1/8 inch for its entire length. Next, drill holes for 1/4-inch rivet, the center of the holes to be 1/2 inch from the ends. Cut a straight piece from the same stock, 13 inches long, drill hole in center and rivet in between first piece. The bevel will now measure, when opened in a T-shape, 6 inches from inside corner to end of one blade and 8 inches to the end of other.

This bevel can be used in place of a square by opening or closing the ends until they measure 10 inches between, with a rule, as in the engraving. A more important use of this bevel is the ascertaining of the amount of stock to cut from angle iron when bending at different angles. Engraving B shows the straight piece with a V-piece cut out the same as the top of the bevel calls for. This enables you to make your edges meet closely when bent down and they will come true in all different angles.

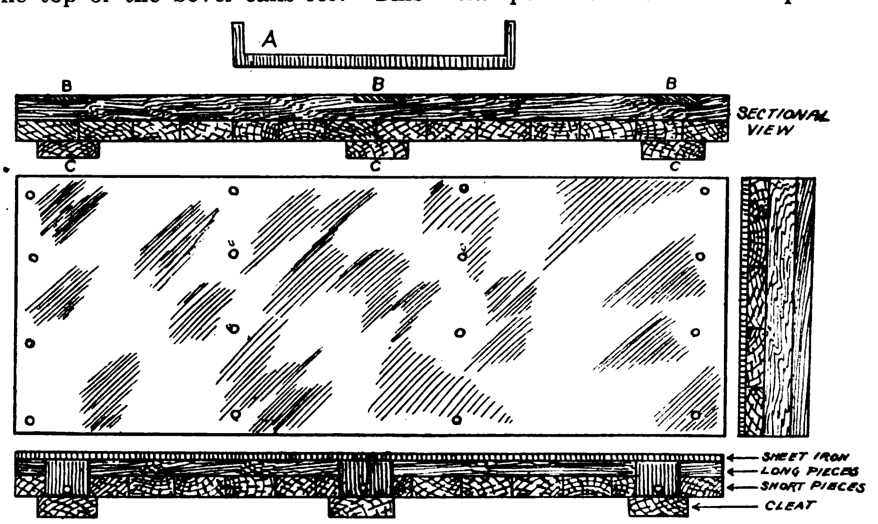
Oftentimes a smith has a flat band to make, with corners beveled as shown at C. These corners are bent down edgewise first and then bent around on the flat. To find out how much to bend edgewise, take a piece of stiff paper, hold flat up against both sides of corner and mark with pencil on top edge. Then set bevel to pencil marks. When bent, it will be found correct.

How to Make a Cheap Leveling Plate

J. L. H. Mosier

If there is a handy, useful and indispensable tool in the smithing room it is a leveling plate. Among the many jobs upon which it is an indispensable helper are the fitting of springs, the leveling of plain plates, T-plates, fifth wheels, etc. These leveling plates are expensive, as they are usually or always of gray cast iron, two inches thick, and with a surface large enough to suit the purpose for which it is required.

A plate of cast iron, 2 by 24 by 36 inches, with one side planed, would cost from $25 upward. A plate to suit the purpose quite as well may be made of hard wood and sheet iron. A good size for general purposes would be 24 by 48 inches. Take three or more pieces of oak, or other hard wood, of the length required, about 1 1/2 inches thick and wide enough when joined to measure 48 inches. Glue the pieces together and have thoroughly dry before removing clamps. Now attach short pieces to



A VERY SERVICEABLE LEVELING PLATE MAY BE MADE VERY CHEAPLY OF OAK

the glued board, having the short pieces run across the short way. These pieces are best attached by means of bolts—5/16-inch countersunk heads—in the long pieces. Now

surface both faces with a good supply of white lead mixed in raw oil. The transversing prevents warping or winding.

Now take three or more irons, 1½ by ⅜-inch thick and as long as necessary, and bend as at A. These pieces are let into the upper surface of the wood, as at BBB, while the bent ends are as long as the thickness of the wood. Each end is bored to take a 2 by ¼-inch lag screw in the lower part to hold the angle in place. On top the cross plates are secured with countersunk bolts which pass through the cleats CCC on the bottom The cleats CCC are counterbored for the bolts so that the nuts do not protrude. The object of the cleats, 4 inches wide by 2 inches thick, is to prevent the wood from warping. It is best to round the corners of the block a little to prevent possible injury.

Now prepare the plate by drilling holes as shown at Fig. D, using No. 10 sheet iron. Countersink the bolt heads until they are perfectly flush. When using the plate place it on a bench where the plate may rest the whole length or on trestles so that plate rests firmly. A little taking up on the nuts will be necessary from time to time until the shrinking is over. A plate made after the above directions will last twenty-five years or more and cost considerably less than the cast ones.

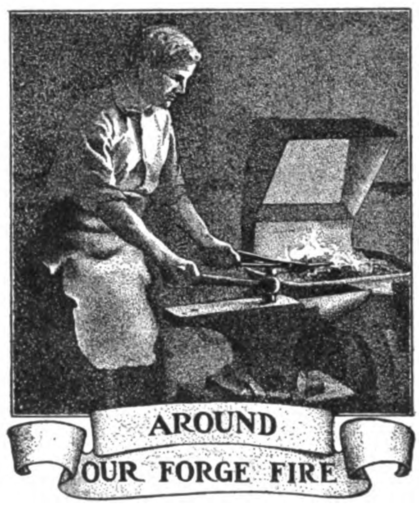
The Arkansas State Association and What It Has Done

F. J. LUNSFORD

President B. W. & H. A. of Ark.

The Blacksmiths', Wheelwrights' and Horseshoers' Association of Arkansas is getting along nicely. We organized a State Association last January. We organized with six counties represented and only nine members to start the organization. We now have a membership of some three hundred in about seven months' time. Some counties are thoroughly organized. We were successful in getting a lien law passed at the last legislature which gives us a lien ahead of any mortgage for a period of three months. We are not going to let up until we get a bill passed to make blacksmiths and horseshoers stand an examination before they can run a business for themselves. That will force these scabs that are working for less than they can possibly support themselves on, to go and work under a licensed man until they can stand examination, and when they know enough about the grand old trade to stand examination, they will be willing to help pick the craft up out of the mire and put it on a level, where it belongs.

We are not what we ought to be to each other. We ought to be more like brothers instead of being enemies, we have raised prices some, but not in proportion to the cost of our living and material. Later on I will give some of our prices. Let me hear from every State President and Secretary who may see this. There is no excuse for us not having a National Organization. The more organizations and stronger organizations, the sooner we will lift our craft up on a level, where it rightly belongs. The Editor has my address.



"Say, Mr. Editor," exclaimed Benton, as he burst into the "Forge Room" and drew up a chair, "I was just down to see Harry Williams at the Carr-Scott Works, and we got talking about hardening steel. Well, we got onto the subject of casehardening and I was telling Harry some things that I knew. After we had been talking of carbon for some time Harry said, 'See here, Benton, you use carbon for casehardening; now, coal is a carbon, why not use it as packing material? It's cheap and it's plentiful.' Well, I told him it couldn't be used, but I didn't know why. Harry wanted a better reason than that, and that's why I'm here asking questions of you instead of your asking me," and Benton lighted a cigar and leaned back in his chair, prepared to listen.

The Editor turmed about in his chair and began: "In the first place we must understand in just what form the carbon enters the steel and under what conditions. The carbon doesn't enter the steel in a lump, or even in the form of dust. It enters in the form of gas. In order to cause the hardening material to give off its gases it is necessary to heat it to a certain temperature. So much for the carbon or hardening material.

"Now let us consider the metal—in this case, steel. In order to absorb the gases of the hardening element the steel must be heated to a certain temperature. Naturally, the temperature at which the hardening material gives off its gases to best advantage and the temperature at which the steel can best absorb the gases must be practically the same.

"Not all forms of carbon are relieved of their gases at the same temperature. Some are entirely relieved of their gases long before the steel is ready to absorb them. Others do not release their hardening elements except at very high temperatures and which would be injurious to the steel.

"Again, some forms of carbon contain elements which are decidedly injurious to steel. Take coal for example; it always contains sulphur to a greater or lesser degree. Even supposing coal gave off its carbonizing gases at a temperature at which they could be absorbed by steel, the gases would contain sulphur gas, which every smith knows is anything but beneficial to steel.

"In actual practice, casehardening is the process of getting as much carbon into the surface of the steel in as short a time as possible while the steel is at a hardening temperature. It has been found by actual results that the carbonizing material should be finely divided to be of the maximum value, and it is also generally considered better to use a mixture of several carbonizing agents rather than one material alone."

"That seems rather strange to me," put in Benton, as the Editor paused. "Looks to me as though it would be easy to pick out that substance which gave off the most carbon under the conditions to be observed and then it would certainly be common sense to use that substance."

"Your reasoning is sensible," returned the Editor, "but you do not take into consideration that various carbonizing substances act upon the metal in various ways. For example, take the animal carbons, such as bone, horn and leather charcoal, a gas called cyanogen is given off by these materials when heated, and this gas in contact with iron divides into carbon and nitrogen. The carbon then combines in part with the metal and part simply adheres to the surface of the metal.

"Now, take resin; alone, its carbonizing action is very small, but in combination with other substances it causes them to adhere to the metal better and by developing hydro-carbon gases it hinders the access of air. Resin melts at a very low temperature, upon further heating decomposes and then burns with a very smoky flame, leaving a residue of porous carbon.

"Of course, when casehardening by packing your articles in an iron box which is afterward made air tight, you don't need to include a deoxidizing material in your hardening mixture, though it is well to use a mixture rather than a single substance. A very good mixture for use in iron boxes is made in the following proportions: Birch charcoal, four parts; leather charcoal, one part; soot, three parts. The charcoal to be finely powdered and the ingredients to be thoroughly mixed. Another good mixture is: Ten parts of best grade granulated raw bone; two parts bone black and one part granulated charcoal leather. These are, of course, thoroughly mixed before using."

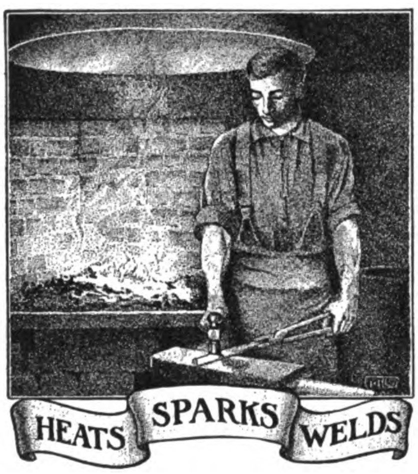
"Well, you've told me a lot I never knew before about hardening and casehardening," said Benton, as the Editor finished. "Think I'll drop in on Williams this afternoon and give him some real information about casehardening."

Things to Forget

If you see a tall fellow ahead of a crowd,
A leader of men marching fearless and proud,
And you know of a tale whose mere telling aloud
Would cause his proud head to in anguish be bowed,
It's a pretty good plan to forget it.

If you know of a skeleton hidden away
In a closet and guarded and kept from the day
In the dark, and whose showing, whose sudden display,
Would cause grief and sorrow and life-long dismay,
It's a pretty good plan to forget it.

If you know of a thing that will darken the joy
Of a man or a woman, a girl or a boy,
That will wipe out a smile or the least way annoy
A fellow, or cause any gladness to cloy,
It's a pretty good plan to forget it.



The best thing for a soft head is a hard knock.

It's too late to take out a policy when you find your shop a pile of charred ruins.

Sometimes when courtesy flies out of the window a good job flies out of the door.

The crown of success never crowns the head of the man who goes around "waiting for something to turn up."

John Hogan says: "Niver heard of any wan gittin' into rale trouble by doin' his work right, did you?"

If you don't know, ask about it. It is only the fool who is afraid to display ignorance when he may gain knowledge thereby.

If you think you need a rest, remember that "It is better to wear out than to rust out."

Don't be grouchy to a man because he brings in a small job. He may bring in a larger one by and by.

Sometimes it would be a good thing if the wagon were the only thing in the shop that had a tongue.

If you don't know how to fix an auto, learn how. The books on auto repairing weren't written for the men who know how.

Remember to keep posted. A knife may have many blades, but it is only the sharp one that is kept busy.

Down in black and white should every transaction be. Then there's no argument and no question about who is right or wrong.

A good start is a heap of help toward a good finish—and it's the finish that counts most.

Exercise of brain is as necessary to health as exercise of body. Does "Our Journal" make you think?

One thing a customer likes is business-like promptness. If you promise a job for a certain day, get it done. If you can't do it, don't promise.

Don't think you are too good for your trade:

"Pray for powers equal to your tasks;
Not tasks equal to your powers."

Don't let your heart become like the iron you weld. Let it glow like the fire you use in welding, emitting sparks of human kindliness.

Some men like to buy cheap tools, so that when anything goes wrong they can blame it onto the tool—at least, 'twould seem so.

Don't think that because an article tells you something about the trade as it was fifty years ago it is not worth reading. We can still learn from our grandfathers.

Sleep is a mighty fine thing—except when you're supposed to be doing something else. And when you're supposed to be sleeping. anything else you do is wrong.

Brush up on your craft knowledge these long winter evenings. Ask our book department—they are glad of an opportunity to help you.

Anyone is likely to be wrong one time or another, and the boss is no exception. But when the boss is "in wrong" don't tell his customers or his competitors—tell him.

No matter how good an animal's promise when a colt, its usefulness is cut short if not properly cared for. And how true also of the human animal!

Knocking may be part of your trade, but be sure you don't let the blows descend on the head of your competitor. It is only the small mind that finds fault with a competitor.

A calendar is the best advertisement a smith shop can have. Every time a man looks at his calendar he sees the smith's name—and most men look at their calendars every day, 365 times in a year.

They say persistence always wins—but how about persistence wrongly directed? An ant cannot make honey, no matter how persistent it may be. Persistence must be rightly directed—then it wins every time.

Of course you have reason for thanksgiving. Look over the pages of the past year and see if you do not find written somewhere a thought, a deed or an action for which to offer up real thanks.

Now what's your opinion of tire setters and tire-setting methods? If we haven't had your opinion, let's have it now and settle this question one way or another, once and for all time.

Don't say we didn't warn you. The days of cracked cylinder jackets are here. Don't leave the shop these nights without draining the water jacket. Then you are sure of a ready-for-work engine in the morning.

Doing business without advertising is like riding in a wagon without springs—it's pretty hard going. Why not start your advertising campaign with a few of our 1912 calendars?

No fair-minded person can object to paying a good price for good work. What everyone kicks about is paying a good price for poor work. Do good work and charge a good price.

It'll surprise you—just try whitewashing the walls of the shop. And now, just before the season of closed doors and windows, is a good time to do it. You'll be surprised how light and cheerful the shop will be this winter.

You'll find no better reference books for your trade than the back copies of "Our Journal." Lots and lots of "Our Folks" make use of the back copies every day. They keep them on hand and when a difficult or out-of-the-ordinary job comes up, they consult their library of back issues.

Good time to clean up that old stock lying about the outside of the shop. The snow and ice of winter won't improve that old stuff—better save what you can and sell or burn the other. Just see if the shop won't appear about one hundred per cent better.

The trouble with many men is that they don't do enough real thinking—they only think they think. Working the brain is real work when done properly. Some real thinkers sweat over their brain work as hard as a laborer over physical work. Don't be satisfied with half-hearted thinking.

A typical example of the "know-it-all-myself" idea is Friend Tardy. He has depended upon himself so long for new things that his brain is now so warped and contracted within itself that he cannot see any farther than his own door. Tom says: "I ain't givin' enybody eny o' my ideas, an' I ain't askin' ideas o' enybody else."

Tell the owner of that horse with scratches to apply the following remedy to the affected feet: Place one ounce of salicylic acid in a bottle and then add eight ounces of olive oil. Shake this up well before using and apply by means of a sponge or cloth tied on the end of a small stick. One application will seldom fail to cure.

Don't take any chances. A good many of "Our Folks" didn't get any calendars last year because they held their orders too long. We've ordered more this year, but there will be a bigger demand. Don't wait another day—send your order now, right this minute. It will pay you to lay this paper down until you get your order into the mails. Then you'll be sure—better take the hint.

If you have been in business for any length of time, have made the best of your opportunities and are a good smith and business man, your biggest investment is not in stock, nor machines and equipment—it is in the good-will of your customers. It is something that cannot be bought or sold, a thing that requires time to acquire, but may be lost in a day by unwise methods. Strive for the good will of the people you want as customers, and business success will stare you in the face.

Our Honor Roll

LOWER RATES IN CANADA

Here's good news for "Our Folks" in Canada. As announced last month on our page of "Timely Talks" we have at last succeeded in reducing the subscription rate for Canada very materially. Instead of $1.50 a year, it is now $1.25; and while this very material reduction has been made on a single year's subscription the reduction in Canadian long-time rates is still more. Just compare the Canadian rates as published heretofore with the revised rates below. This reduction now enables our Canadian readers to take advantage of our long-time rates at a very slight advance over the domestic long-time rates.

This will also enable our Canadian friends to get better representation on Our Honor Roll. Australia is exceptionally well represented, and now that it has been possible to reduce the Canadian rates our friends across the border should find it easy to outnumber the Australians in a very short time.

	U. S. and Mexico	Canada	Other Countries.
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s

A paper with a list like this and with several thousands of other subscribers who have paid in advance to 1914, 1913 and 1912 must be valuable. Practical smiths don't pay for a paper in advance unless that paper is practical and worth real money. Ask your neighbor to subscribe—show him this list.

NAME	Subscription Paid to
I. J. Stites, New Jersey	Jan., 1923
R. S. Crisler, Kentucky	Jan., 1920
T. P. Considine, Massachusetts	Dec., 1918
Richard Brenner, Texas	Feb., 1918
W. L. Roark, Texas	Mar., 1917
A. Tillman, California	Feb., 1917
Walker Bros., New Zealand	Feb., 1917
C. J. Hall, Washington	Dec., 1916
W. H. F. Brauch, North Carolina	Oct., 1916
Clark Olds & Co., Nebraska	Oct., 1916
Irwin Scott, New York	Oct., 1916
J. K. Glinicki, Michigan	Sept., 1916
Oscar Buhner, Maryland	Sept., 1916
A. J. Hammond, California	Sept., 1916
Robert Murray, California	Sept., 1916
D. E. Wright, Pennsylvania	Sept., 1916
J. S. Haskell, Colorado	Sept., 1916
R. Sommer, Australia	Sept., 1916
J. A. Sequin, Canada	Aug., 1916
James Clarke, Jr., Australia	Aug., 1916
Dispatch Found'y Ltd., N. Z.	Aug., 1916
C. P. Robertson, South Africa	Aug., 1916
A. A. Bahlke, Michigan	July, 1916
J. K. Hansen, Australia	July, 1916
J. B. Barker, Illinois	July, 1916
H. M. Larsen, Wisconsin	July, 1916
Geo. P. MacIntyre, Maine	July, 1916
J. Waycich, South Africa	June, 1916
W. Voight, South Africa	June, 1916
Martin Jensen, Wisconsin	June, 1916
Chester Humbert, Wisconsin	June, 1916
Lincoln Underhill, California	June, 1916
M. Broton, North Dakota	June, 1916
Hans Eriksen, Illinois	June, 1916
C. Morrell, New Brunswck	June, 1916
J. O. Conrad, Kansas	June, 1916
Adam Schmitt, Michigan	June, 1916
James Sinclair, West Australia	May, 1916
H. Baker, Australia	May, 1916
E. Q. Krehbiel, Kansas	May, 1916
C. H. Cairns, New York	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vermont	May, 1916
C. A. Stebbins, Kansas	May, 1916
Sanford Baker, Missouri	May, 1916
P. A. Peterson, Iowa	April, 1916
D. E. McDonald, Florida	April, 1916
James Baxter, South Africa	April, 1916
E. P. Dignan, South Australia	April, 1916
W. H. Winget, Vermont	April, 1916
C. H. Alexander, New York	Mar., 1916
A. M. Harebo, Wisconsin	Mar., 1916
George Howard, Kansas	Mar., 1916
G. N. Follmar, Nebraska	Mar., 1916
W. Willoughby, Michigan	Mar., 1916
H. Hoffmeyer, New Jersey	Mar., 1916
Frank L. Locke, New York	Mar., 1916
Frank L. Evarts, Connecticut	Mar., 1916
C. R. Winget, Vermont	Mar., 1916
Hugh & John Chisholm, N. Z.	Mar., 1916
C. F. Molkenten, Australia	Mar., 1916
H. D. Phillips, South Australia	Mar., 1916
E. P. Jones, Kansas	Feb., 1916
C. K. Cornelison, Pennsylvania	Feb., 1916
M. Klitgord, New York	Jan., 1916
O. Stenning, South Dakota	Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts	Jan., 1916
Feldmeyer & Schaake, Kansas	Jan., 1916
Jas. A. Sharp, Massachusetts	Dec., 1915
J. Krahulec, Illinois	Dec., 1915
P. E. Dahlfurst, California	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Nebraska	Dec., 1915
G. S. Fisher, Nebraska	Dec., 1915
Printers Supply Company, Nebraska	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Virginia	Dec., 1915
C. J. Ash, Kansas	Dec., 1915
F. H. Joslin, Massachusetts	Dec., 1915
C. W. Ames, Massachusetts	Dec., 1915
C. L. Sorensen, Nebraska	Dec., 1915
E. Williams, New York	Dec., 1915
W. Urquhart, New Zealand	Dec., 1915
W. Rupe, Oklahoma	Dec., 1915
L. S. Kocher, Iowa	Dec., 1915
P. W. Frazer, New Zealand	Dec., 1915
D. Codere, Illinois	Nov., 1915
F. S. Woody, Iowa	Nov., 1915
George H. Ilsley, Massachusetts	Nov., 1915
M. I. Huff, Missouri	Nov., 1915
Stephen Wachter, Pennsylvania	Nov., 1915
C. C. Perry, Australia	Oct., 1915
Sidney Stevens Imp. Co., Utah	Oct., 1915
W. H. Findlay, New Zealand	Oct., 1915
R. F. Watson, California	Oct., 1915
H. R. Stone, Connecticut	Oct., 1915
F. Teuber, Georgia	Oct., 1915
Ed. Hammill, California	Sept., 1915
R. D. Simkins, Pennsylvania	Sept., 1915
T. J. Reynolds, Pennsylvania	Sept., 1915
Wm. Bates, Texas	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, West Virginia	Sept., 1915
Hugh L. Lynn, Kentucky	Sept., 1915
A. Chargois, Queensland, Aus.	Aug., 1915
A. M. Byfield, West Australia	Aug., 1915
C. E. Allen, Nebraska	Aug., 1915
M. J. Roder, Montana	Aug., 1915
J. E. Lyon, Texas	Aug., 1915
F. W. Krenz, California	Aug., 1915
Jos. P. Rotolinski, Massachusetts	Aug., 1915
Jas. A. Buchner, Michigan	July, 1915
G. N. Ferree, Utah	July, 1915
T. O. Chittenden, New Zealand	July, 1915
The Goldfields Diamond Drilling Company, Australia	July, 1915
J. A. Lawton & Sons, South Australia	July, 1915
I. Murray, South Australia	July, 1915
J. W. Ivil, Utah	June, 1915
E. L. Herving, Florida	June, 1915
G. R. Twedell, Mississippi	June, 1915
Schintgen & Maier, Minnesota	May, 1915
Van den Wildenberg Brothers, Wisconsin	Mar., 1915
V. Priessnitz, Wisconsin	Mar., 1915
F. J. Ties, Wisconsin	Mar., 1915
J. Marshall, Indiana	Mar., 1915
H. D. King, New Jersey	Mar., 1915
W. E. Bedford, North West Territory	Mar., 1915
J. E. Johnson, Pennsylvania	Mar., 1915
Wyndham Mauk, Ohio	Feb., 1915
G. H. Longley, Massachusetts	Feb., 1915
H. N. Seeley, New York	Feb., 1915
J. A. McGaughey, Washington	Feb., 1915
A. E. Roesner, West Australia	Jan., 1915
Alf. Seidel, Nebraska	Jan., 1915
Brown & Peterson, North Dakota	Jan., 1915
H. F. Schreiber, Pennsylvania	Jan., 1915
A. C. Elder, Georgia	Jan., 1915
C. W. Enyeart, Indiana	Jan., 1915

Ten Questions For the Month

The questions this month are for the automobile repairman, and there is not one of the ten that the auto repairer should not be able to answer.

Someone has suggested that we change this question-and-answer feature somewhat and instead of publishing ten questions each month and answering them the succeeding month we publish questions and answers together and continue on one subject or branch of craftsmanship until practically all of the subject has been covered. What do you think of this suggestion, Mr. Reader? We want to hear from you on this. We want your opinion. We will do whatever the majority say, but we want to hear from you.

The questions this month are on automobile troubles and repairing. The answers will appear next month.

1. What causes loss of compression and what is its effect?
2. What causes misfiring and how is it remedied?
3. What is meant by valve timing and why is it necessary?
4. When dry cells are exhausted how can they be recharged?
5. What causes carbon deposit in the cylinders and may it be removed?
6. If the ignition fails how would you go about locating the cause?

7. What will cause the exhaust to smoke unreasonably?

8. What may cause explosion in the muffler?

9. If a screw or stud breaks off in the hole or at the metal surface how would you remove it?

10. How many valves are there on each cylinder of the motor?

We suggest that you write your answers to these questions and then hold them for comparison with the answers which will appear next month.

Answers to Questions in October Issue

1. A knowledge of anatomy enables the shoer to shoe correctly by showing him the very definite relations existing between certain positions of the limb and certain hoof forms.

2. The pododerm.

3. To protect the hoof from wear.

4. To cushion the foot and to prevent slipping.

5. Yes; but only when grown to such an extent as to appear ragged or in certain conditions of disease. In a healthy state, never.

6. Bruising of the ground surface of the foot inside of the hoof wall.

7. It removes the varnish-like film called periople from the surface of the foot, thus allowing the natural moisture of the foot to evaporate. The consequence is a drying of the horn, and if the condition continues for any time a change in the form of the hoof is but natural.

8. Apply front shoes no longer and no wider than the hoof with the heels beveled downward and forward. The hind shoes to be shortened at the toe and rolled. Shoes to be fitted at the toe so that at least three fourths the thickness of the wall projects.

9. Foot bone, navicular bone, short pastern, sesamoid bones, long pastern and canon bone.

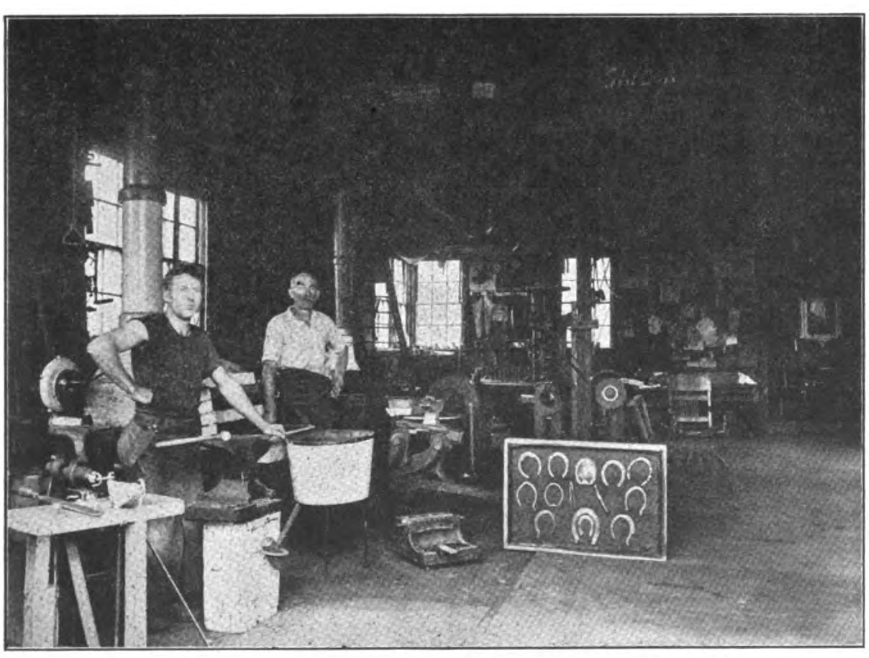
10. A toe crack is a seam down the center of the front of the hoof. It is caused by wounds to the coronet, dryness and excessive work on hard streets.

A General Shop of Illinois

B. Meeker

I would like to say a word in regard to fast shoeing. If a good number of the shoers would try and see how *well* they could do their work instead of how *fast*, not only they, but the horses and the horse-owners would profit by it.

I have nailed four shoes, with seven nails to the shoe, using No. 5 Capewell nails, in just four minutes from the time I picked up the first foot until the horse was ready to go out. But I am not proud of my fast work. I am proud of our shop and the work we get to do, and we try to please all who come to our shop. We find some trouble in pleasing some, but make the best of it, and if we lose one customer we try to get two in his place. The engraving shows my partner, Mr. Barber, at the forge, while I am at the first fire.



A GENERAL POWER SHOP OF ILLINOIS, RUN BY BARBER AND MEEKER

Dies and Formers and the Work They Do

F. F. Hoeffle

The experience with tools of all descriptions in the smithing department, for various uses, such as stamping dies, forging machine dies and mechanical blacksmith tools for bending iron into shapes for all kind of construction work, is a very interesting undertaking. The chief results of experience are clearness of view in discerning the proper course to pursue today, that will set aside and assure tomorrow's betterment.

The men who have devoted their time in this direction should certainly have grounds for appreciating their attainments, for such knowledge is acquired only by years of close observation and a strict application of facts developed by experience.

The tool question is a very interesting factor, and a very hard one for the Master Smith. His importance as a creator of output is not always appreciated as it should be by all shop departments and men. Conditions thus frequently cause arguments to spring up, because men do not seem to realize the value of a tool. The result is the manufactured product suffers, and surely to have such shop conditions exist does make it a very serious proposition to the man directly interested in his tools.

Success in this work largely depends on being able to design your own tools. This coupled with the knowledge of forging will certainly equip a man with confidence and make him a valuable man. Great care and judgment should be brought to bear in the designing of dies and formers, in order to avoid as much as possible having light and heavy parts in the same casting, as this will cause unequal shrinkage, throwing a strain on the lighter parts, causing them to break when given a sudden jar. When this is avoided it will enable the foundryman to get a formula in the casting that will give the best possible strength. While it is understood, cast and forged steel makes the best dies for strength, I have had most excellent results with grey iron dies and formula made up from charcoal pig iron, also semi-steel.

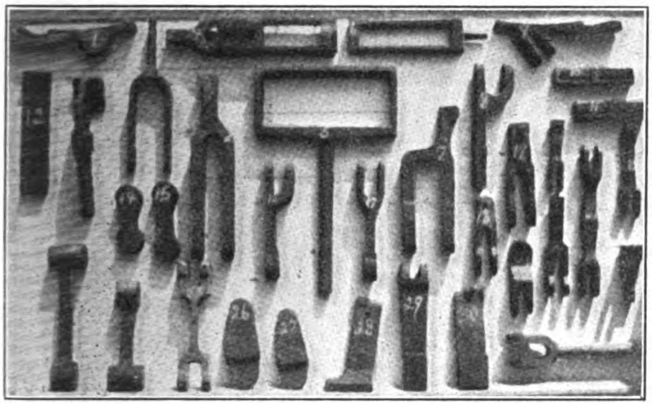


FIG. 1—THE FORGING MACHINE SAVES BOTH TIME AND LABOR

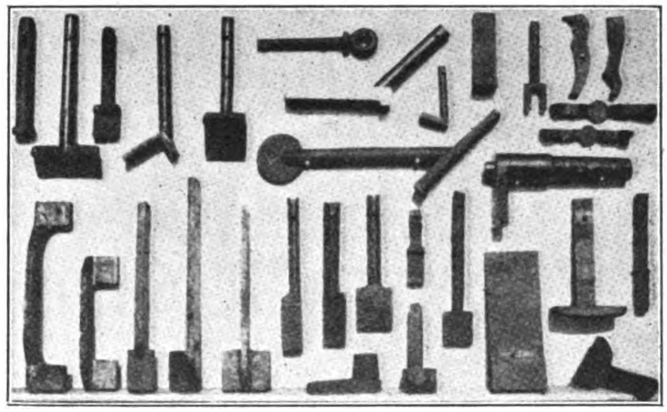


FIG. 2—PARTS ARE DUPLICATED QUICKLY AT LOW COST

The following chemical analysis taken for hammer dies, forging machine dies and formers of all descriptions for bending iron, ranging in weight from 500 lbs. to 5,000 lbs. This formula to a great extent does eliminate the fire cracks to the portion of dies subjected to the intense heat in service.

Note formula, by Mr. M. Dolan, General Foundryman-Foreman, L. & N. Railroad.

Silicon	.80 to 1.25
Sulphur	.06 to .10
Phosphorus	.30 to .50
Manganese	1.25 to 2.25
Combined Carbon	.75 to 1.00
Graphitic Carbon	2.25 to 2.75

Again, for lighter dies and formers, less than 500 lbs., it would be quite necessary to raise the Silicon up to 1.50 or 2.00.

Again, relative to the grey iron dies for forging machine, I have found it to be the better plan to have all die sinking done by the pattern maker, and such dies are plenty good enough for any article that is to be struck in a railroad shop. Of course, manufacturing concerns, where it is necessary to stamp at the drop hammer or to strike articles at the forging machines, it is quite right to have good hard steel dies, in order to get a good clean commercial article. The steel dies to range near about from .50 to .60 Carbon, and die sinking in this case to be done in the machine shop, especially so when the articles that are to be struck are for commercial hardware purposes.

It has been found practicable, when parts of the grey iron dies become worn and disabled, to place into the worn parts inserts of steel, about .40 Carbon. These inserts have given good results, in fact, the best. Inserts made from high speed steel have been tried out and failed to stand up, for the reason that the high speed steel inserts will not resist water. Hence, fire cracks take place and the dies will not do good work under such conditions

The very greatest question coupled with tools is the heating proposition To operate tools commercially the question is, how much material can you heat? With power and proper application of dies there is no limit to the different characters of forgings that can be struck.

In order to place this matter more clearly before the reader and to illustrate the different characters of forgings that can be made with grey iron dies, as per formula outlined in the above, note photographs of forgings made at the South Louisville Shops of the L. & N. Railroad. Figs. 1, 2, 3 and 4 represent groups of forgings that were made at the forging machine. Fig. 5 represents a group of stamp forgings that were made at the steam hammer. To appreciate the value of tools to their fullest extent we must learn to realize and to estimate the cost

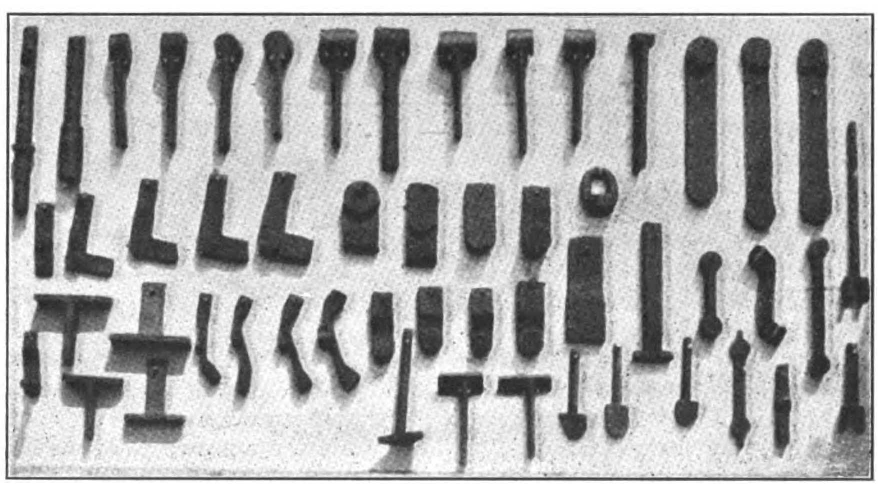


FIG. 3—THE FORGING MACHINE MAY SHOW A LOSS IF NOT PROPERLY MANAGED

of forging an article on the anvil against the cost of striking the same article at the machine, at the drop or at the steam hammer. Again, to consider the number of articles that can be produced at the anvil per ten hours, against the number of the same article that can be produced at the forging machine, at the drop hammer or at the steam hammer. The time saved with a multiplied output of work and, in addition, a reduced cost to produce the forging, is the prime factor to be considered in the manufacturing of forgings. The forging, of course, must be physically good.

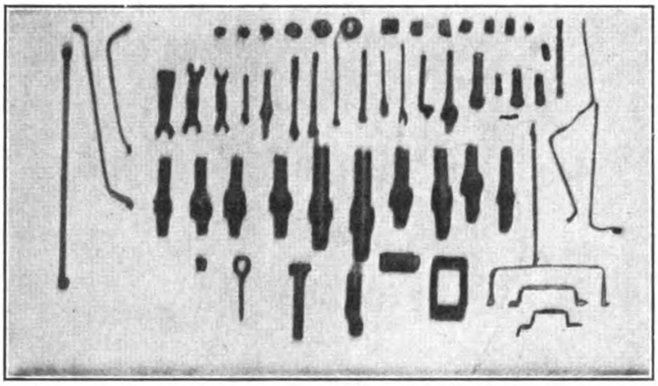


FIG. 4—THERE IS A POINT WHERE MACHINE FORGING BECOMES EXPENSIVE

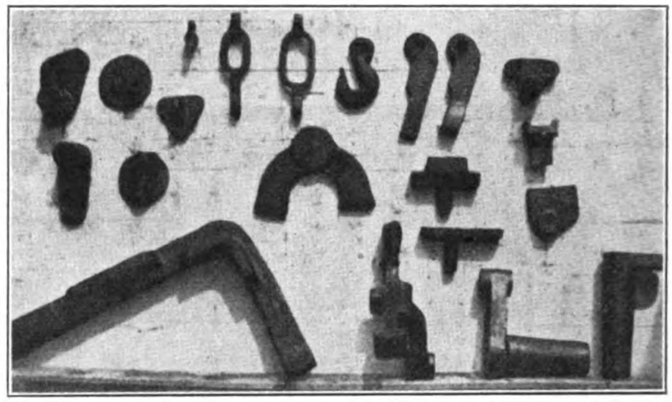


FIG. 5—THE STEAM HAMMER MAY BE USED FOR STAMP FORGINGS

Frame Making and Repairing

H. D. Wright

This subject is an important one on every railroad, and I attempt to give here some of my experience and observations upon the subject.

Engraving No. 1 gives you an idea of the frame back blocked out ready for the limbs and braces to be welded in place. The lugs should not exceed three inches in height, and by this method when the limbs are welded on you will avoid having any cross-grained iron in the frame legs.

Fig. 2 illustrates how the limbs should be forged and scarfed ready to weld onto the frame back. The boss that is left on the limb for the braces should not exceed two and one half inches in height. Before these parts leave the forging hammer they should be scarfed to an angle of 45° by the use of the V-block and fuller with very little extra trouble. I then weld the limbs to the frame back in one heat. I prefer the frame leg put on in one heat, even though the outside scarf does show a little, than to have the second heat taken and the center of the iron loosened up by not having the heat through to the center, and that is what a second heat will do. It does not do any good to weld up the outside solid and then take it to the planer and plane it all away, and there are certain heats that open up a weld very easy while working. For example, take two pieces of 2″ x ½″ iron, bring them to a good welding heat and lay them down. You will then find it a difficult matter to pull them apart when cold. Then take the same two pieces of iron, if you have not pulled them apart, put them in the furnace and bring them up to a greasy heat and you will not have any trouble to separate them. The same condition is true in frame work and while you may have trouble in a day-work shop to get the men to make a weld in one heat, we have no trouble on this score from a man working piece work.

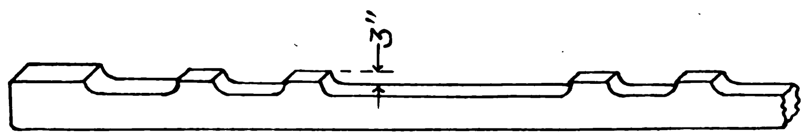


FIG. 1

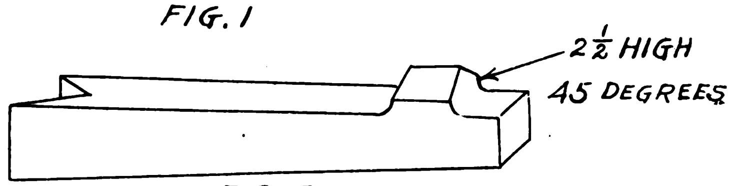


FIG. 2

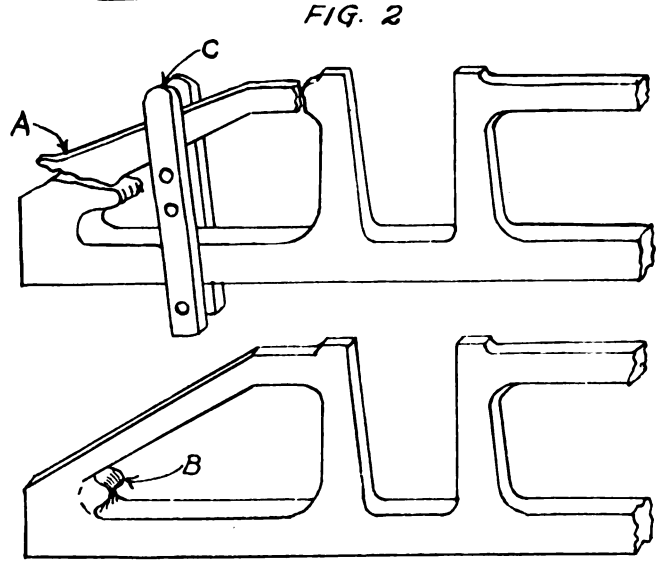


FIG. 3

FRAME MAKING AND REPAIRING IS AN IMPORTANT SUBJECT IN EVERY RAILROAD SHOP

Fig. 3 illustrates the method of putting in the bracing, commencing at the back end of the frame. A

shows the position of the brace before the hammer makes the weld and Fig. B is the finished weld. Now take a gouge and cut away the extra metal between the frame brace and back as shown by dotted line. This method will make a sound weld, but care should be exercised that the bevel on the frame back has the correct taper, in order that when the hammer strikes it it will be driven into place. The brace C is simply two pieces of 4" x 7/8" iron bolted fast to the back, and the holes are spaced the correct distance to allow the brace to slide into place.

When the brace is put into place ready for welding it will stand away some distance from the limb, and as a rule we put a block of soft wood between the brace and the limb with the grain running the right way, so that when the brace begins to draw, the block will split, allowing the brace to come back into position.

Fig. 4 illustrates the parallel braces in place and should be welded first at A and B and then at C and D. By this method of welding you avoid a majority of the strains that come on the legs, and a few blows of the hammer on the braces after the weld is made will further remove these strains. The proper place to strike the braces with the hammer is indicated with arrow heads.

Fig. 5 illustrates the first leg as used on some of our heavier engines and is made in one piece under the hammer. This type of front section is all finished in the machine shop and drilled before it is welded to the frame.

In Fig. 6 is shown the type of front limb that is most familiar and A shows the part ready to weld in place. Weld a small stub on the frame back and then weld on the front limb.

In making the offset frame shown in Fig. 7 the back is made in two pieces, then welded at A and proceed the same as if it were a straight back.

The writer has been making frames for the last fifteen years and has been constantly on the lookout for new frame stunts, but to date will have to state that the aforesaid methods in his opinion are the soundest, quickest and cheapest.

In taking up the repairing of frames I find the work very much similar to new work, and scarf all my work on a 45° angle. This is due to the fact that the component

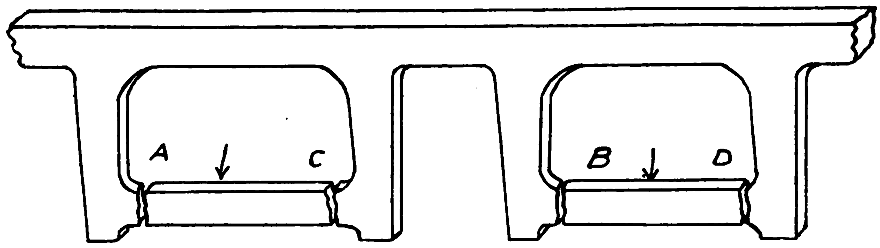


FIG. 4

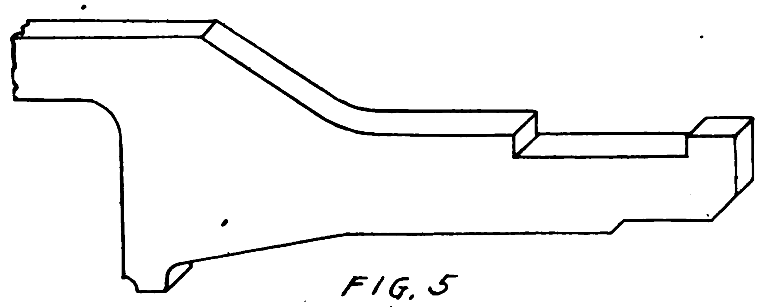


FIG. 5

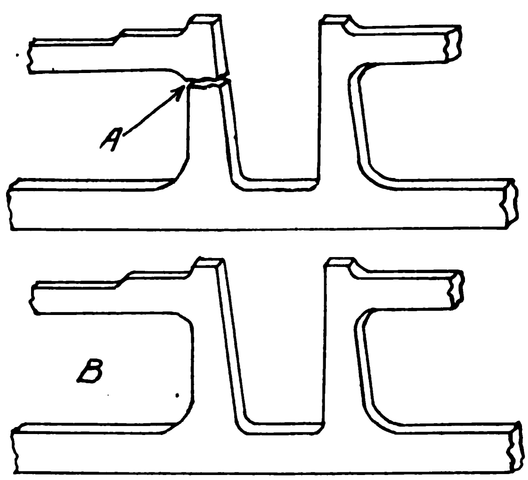


FIG. 6

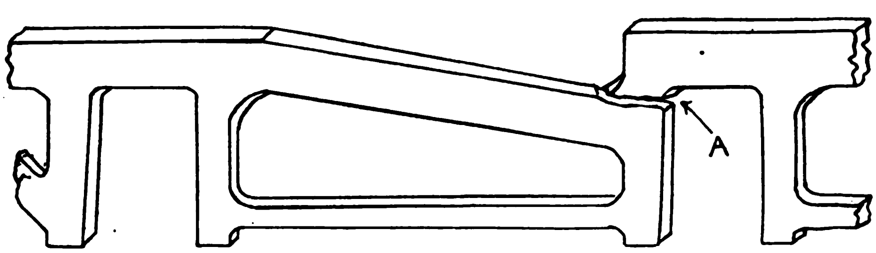


FIG. 7

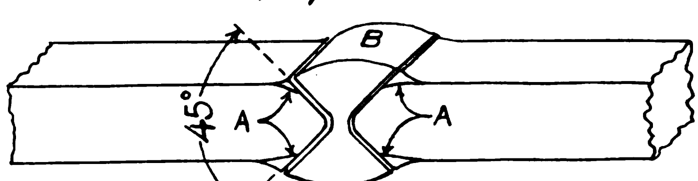
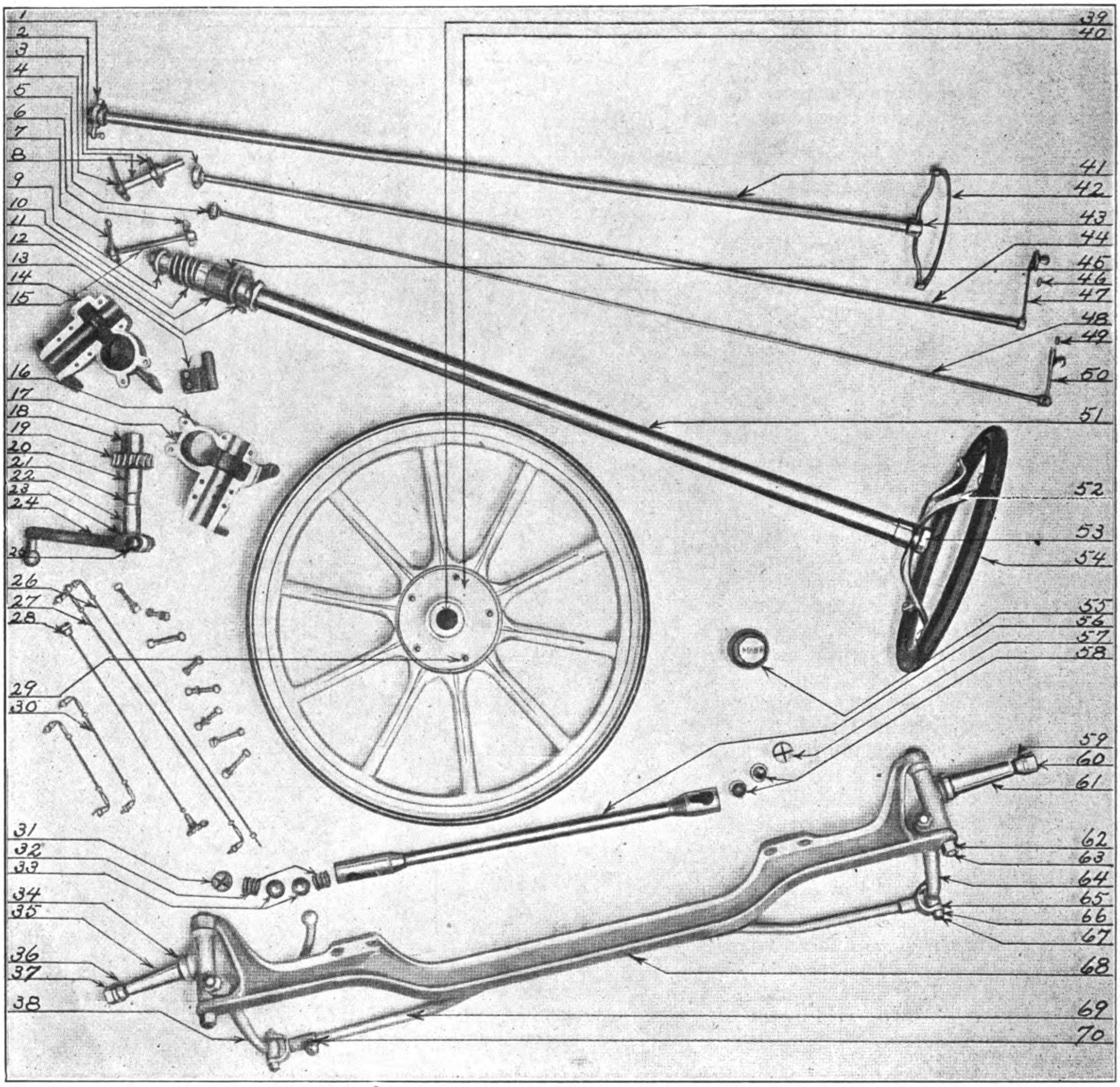


FIG. 8

THERE ARE MANY POINTS TO BEAR IN MIND WHEN REPAIRING FRAMES AND NOT THE LEAST IS THE STRAIN ON THE FRAME



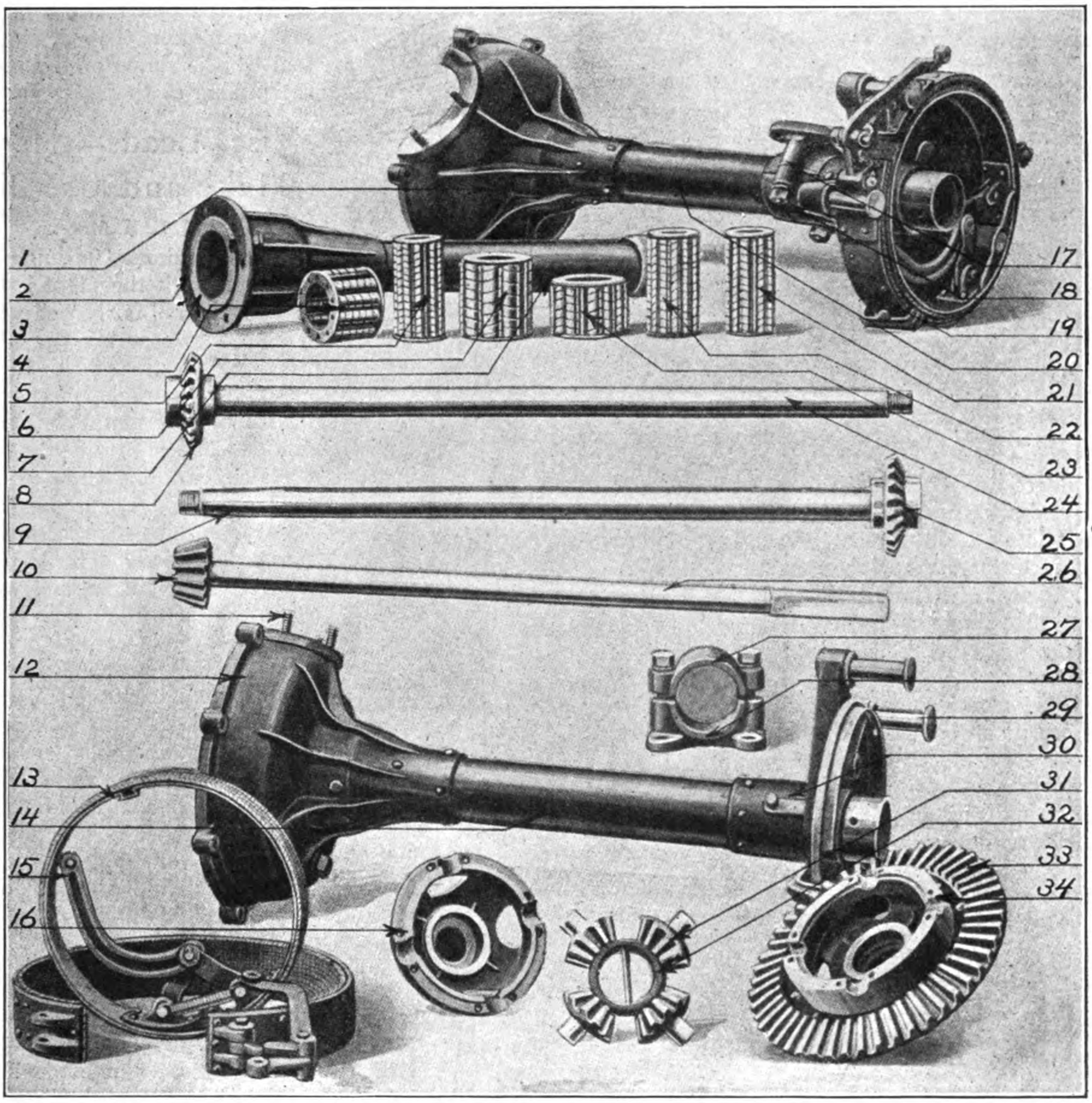
FRONT AXLE AND STEERING CONTROL PARTS

1—Steering gear quadrant tube support—lower.
2—Steering gear throttle control pinion.
3—Steering gear throttle control tube—short.
4—Steering gear throttle control lever.
5—Steering gear spark control pinion.
6—Steering gear spark control gear.
7—Steering gear spark control lever.
8—Steering gear throttle control gear.
9—Steering gear worm thrust washer.
10—Steering gear worm.
11—Steering gear worm adjustment nut.
12—Steering column floor collar.
13—Steering gear spark and throttle control gear bracket.
14—Steering gear case—lower half.
15—Steering gear spark control rod—short.
16—Steering gear worm adjustment nut lock.
17—Steering gear case—upper half.
18—Steering gear lever shaft bushing—short.
19—Steering gear worm wheel.
20—Steering gear lever shaft bushing—long.
21—Steering gear lever shaft.
22—Steering gear lever shaft bushing—long.
23—Steering lever arm screw.
24—Steering lever.
25—Steering lever arm screw nut.
26—Throttle control rod, from steering gear to bell crank.
27—Ingnition control rod, from steering gear to bell crank.
28—Throttle control rod, from carburetor to bell crank.
29—Wheel hub bolt.
30—Ignition control rod, from bell crank to timer.
31—Steering link socket plug.
32—Steering link spring.
33—Steering link block.
34—Front axle spindle inner bearing cone.
35—Front axle spindle.
36—Front axle spindle outer bearing cone.
37—Front axle spindle nut.
38—Front axle steering arm.
39—Front wheel outer bearing snap ring.
40—Front wheel hub.
41—Steering gear quadrant bracket tube.
42—Steering gear spark and throttle control quadrant.
43—Steering gear spark and throttle control quadrant bracket.
44—Steering gear throttle control tube—long.
45—Steering gear worm adjustment nut.
46—Steering gear spark and throttle control ratchet pin.
47—Steering gear throttle control hand lever.
48—Steering gear spark control rod—long.
49—Steering gear spark and throttle control ratchet pin.
50—Steering gear spark control hand lever.
51—Steering gear jacket tube.
52—Steering gear hand wheel spider.
53—Steering gear hand wheel nut.
54—Steering wheel rim.
55—Wheel hub cap.
56—Steering link.
57—Steering link socket plug.
58—Steering link block.
59—Front axle spindle outer bearing cone.
60—Front axle spindle nut.
61—Front axle spindle.
62—Front axle pivot pin nut.
63—Front axle spindle pivot nut.
64—Front axle steering arm.
65—Front axle cross rod fixed end.
66—Front axle cross rod pivot pin nut.
67—Front axle cross rod pivot pin.
68—Front axle.
69—Front axle cross rod.
70—Front axle cross rod adjustable end.

faces are equal and the wedge will not take any more of the blow than the scarfed frame piece. This gives an equal amount of friction to both parts and they weld thoroughly from point to outside of frame.

The engraving, Fig. 8, gives an idea of how frames are repaired under the engine. I will say at this point

that we make all our own preparations and do not call on the machine shop for any help whatever. In fact, we have had only one frame that had to be sawed out by a machinist and that was due to the weld being right against the firebox.



HYATT ROLLER BEARING REAR AXLE

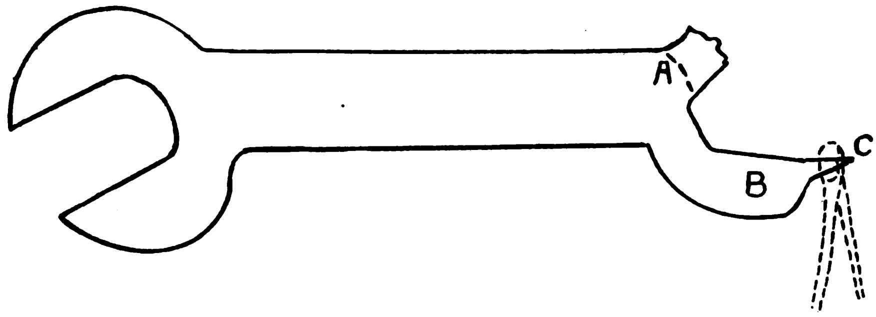
1—Rear axle gear case.
2—Rear axle propeller shaft case.
3—Rear axle propeller shaft rear bearing outer sleeve.
4—Rear axle inner bearing.
5—Rear axle outer bearing.
6—Rear axle propeller shaft gear bearing.
7—Rear axle propeller shaft tube.
8—Rear axle differential gear.
9—Rear axle shaft.
10—Rear axle drive pinion.
11—Rear axle propeller shaft case stud.
12—Rear axle gear case.
13—Rear axle internal brake band.
14—Rear axle shaft casing.
15—Rear axle internal brake operating link.
16—Rear axle differential case.
17—Rear axle spring seat.
18—Rear axle spring seat cap.
19—Rear axle external brake band.
20—Rear axle shaft casing.
21—Rear axle propeller shaft front bearing.
22—Rear axle outer bearing.
23—Rear axle inner bearing.
24—Rear axle shaft.
25—Rear axle differential gear.
26—Rear axle propeller shaft.
27—Rear axle spring seat cap.
28—Rear axle spring seat.
29—Rear axle external brake stop pin.
30—Rear axle brake support.
31—Rear axle differential pinion.
32—Rear axle differential pinion journal.
33—Rear axle drive gear.
34—Rear axle differential case.

In heating up the frame member, for the purpose of cutting out or welding, we build a brick furnace around the fracture, keeping the member in the center of combustion and use fuel oil burners, one on either side. One burner is below the fracture and the other above it. This method allows the flames to make a circuit around the frame and heat it up evenly. In building the furnace we always leave two or three bricks on each side so they can be taken out without disturbing the rest of the brick. This method often saves a great deal of time, for if the weld is not made perfectly on the first heat the brick can be replaced and another heat taken.

In preparing the frame for welding, we cut the frame out on a 45° angle and then warm up and spring apart $\frac{5}{16}$ inch or $\frac{3}{8}$ inch. We then cut in at point A and drive in four wedges to bring up the stock to allow for wasting in welding. The large wedge is then made and is driven into place, making a tight fit. Then when the frame is brought to a welding heat the aforementioned loose brick are removed from each side of the furnace and the rams used.

By using the above method it has been my good fortune to successfully weld 136 frames under engines in the past three years.

It may be a little off of the subject to state here that since I have



HOW THE AUTOMOBILE REPAIRMAN CAN UTILIZE A BROKEN WRENCH

had my frame fire gang and repair men broken in on my methods and working piece work, that the frame work does not cause me any trouble or time and works out very satisfactorily.

How to Judge Hard From Soft Steel

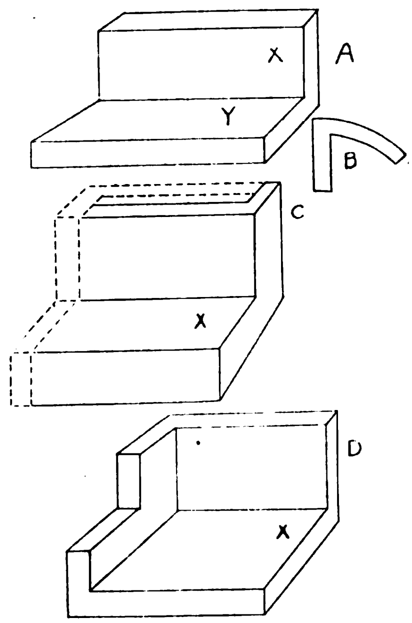
J. N. Bagley

Very often we want a piece of steel and are obliged to go to the scrap pile for it, and after finding it we are unable to tell whether or not it is hard or soft steel. There are, however, a number of ways of telling. A very good way, providing the piece is large enough, is to break it. Hard steel when broken from the bar will show a very fine and smooth fracture, while soft steel will show a coarse, rough fracture.

Take two bars of steel, one hard and one soft, and nick each of them a little distance from the end, and place over the square hole in the anvil and strike with a sledge. If the steel is hard it will break at the nick the first blow or two, while if it is soft it will require many blows and possibly not break at all.

We will suppose that we have a number of chisels made from tool steel and are desirous of knowing which of them are made of hard steel. A very good plan is to notice the heads of the chisels; the soft chisels made of steel of about 60-point carbon will be flattened at the head, while the chisel of 75-point carbon will crumble off as it widens. If the head of the chisel splits and breaks off in slivers about ¾ of an inch long it indicates that the steel is about one per cent in carbon. This is too hard for chisel use and should be used for lathe tools and such like.

One may tell hard from soft steel while forging. Soft steel will give under the hammer much easier than hard steel. The soft steel will hold heat quite a little longer than hard steel.



HOW TO MAKE AND USE VISE LEADS

A Cotter Puller From an Old Wrench

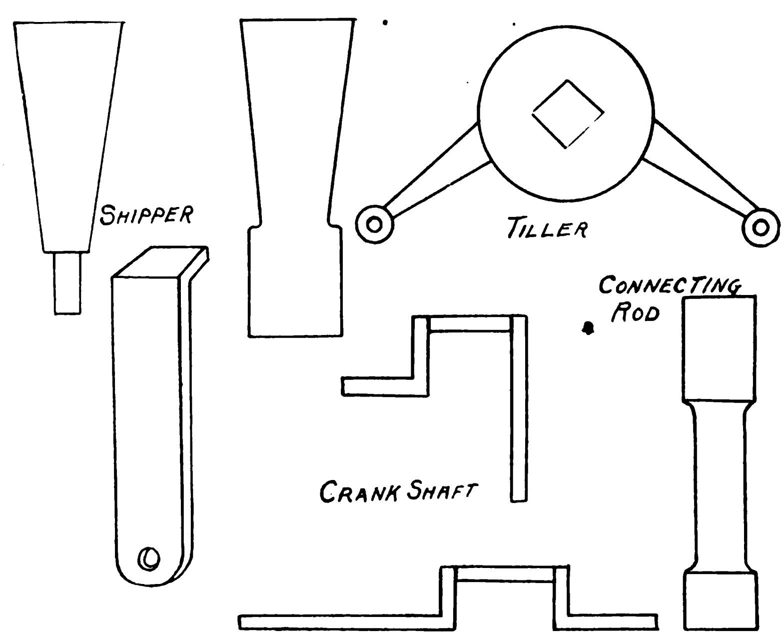
Around almost every shop will be found a few old wrenches with one of the jaws broken off. The broken end is of no use for anything and is generally thrown into the scrap pile. Some of these old wrenches may be made into cotter pullers with very little trouble, and they work very well. Grind off the broken jaw, as shown by dotted line A, and grind the good jaw B down on the end, as shown at C, and the puller is complete. The rocking motion that is given to the tool by the shape of the jaw makes the pulling of the cotters easy.

Vise Leads—How to Make and Use Them

J. L. H. Mosier

For the ordinary finishing of forged or other work the plain jaws of the vise fill the bill fairly well; but when it comes to securing smooth or finished surfaces, such as axle spindles or finished journals, there must be a device of soft metal with which to hold the article in the vise. In many cases pieces of brass, zinc or copper or plain sheet iron, are used. However, there is nothing so well suited to the purpose as lead. The best finished surfaces may be handled with leaden vise jaws without leaving a mark upon them.

In the engraving, A shows the lead vise jaw as it comes from the mould. The part X fits in the jaw, while Y is the part which lies on the tops of the jaws of the vise and is turned down on them to hold the jaw in position. The part which fits the jaws is ½ or ⅝ inch thick, about 1¼ inches wide, and as long as the jaws of the vise. The part Y should



SEVERAL FORGINGS BY THE BOAT AND SHIP SMITH

be about $2\frac{1}{4}$ to $2\frac{1}{2}$ inches wide and about $\frac{3}{8}$ inch thick. This part fits and rests on the top of the jaws. At B is shown the shape of the lead when bent and fitted for use.

To make these we must first make moulds of iron in two parts—an upper and a lower part. The parts of the mould are shown at C. The dotted lines show the lines of the other part of the mould, and when the two are placed together X is the open space for pouring in the lead and for forming the jaw. At D is shown the other half of the mould.

It is well to make the moulds for 6-inch leads, though it is easy to make the leads shorter by moving the moulds together. When ready to pour your lead, clamp the two pieces at XX and hold them in the vise; then pour in the lead and separate when cold.

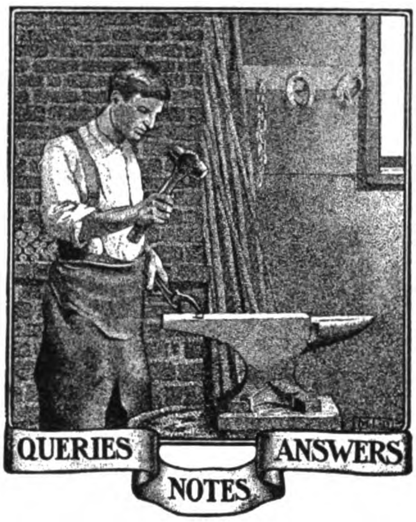
Boat Forgings and Ship Smithing

The Tiller, Shipper Lever, Connecting Rod and Crankshaft

Dayton O. Shaw

Sometimes a tiller with two arms is wanted. To make this I take $1\frac{1}{2}$ inches square of soft steel, fuller down to $\frac{3}{4}$ of an inch, $1\frac{1}{2}$ inches from the end, then shape the head to octagonal or round. Next punch a small hole in center, close to head and split. Taper each arm down to $\frac{1}{2}$ inch, leaving stock enough on end to punch a $\frac{1}{2}$-inch round hole. When finished the arms should be 10 inches or 12 inches in length. Whent he tiller is fastened to the rudder post one arm points to port and the other to starboard. To reef your rope make the end fast in starboard ring, pass through sockets just underneath the gunwale and follow around the boat. When you get around to the starboard ring cross over and make fast to port ring. With this arrangement one can steer in any part of the boat.

To make shipper lever I take a piece of soft steel $\frac{7}{8}$ of an inch in diameter, 6 inches long, back up one end to 1 inch and taper to $\frac{3}{4}$ of an inch 4 inches from end. Fuller down to $\frac{5}{16}$ of an inch and flatten. Leave the end square so the machinist can drill for his center. After the handle has been turned the flat part is welded to a piece of soft steel, $\frac{1}{4}$ by $1\frac{1}{4}$ inches. The connecting rod should be made of soft steel and forged in one piece. I have tried all ways to forge a crankshaft and have come to the conclusion that it is best to start at one end, work the corners out square and finish as I go. In making the last corner I give a twist in the wrist pin and that gives a chance to work more easily. For a 1-inch crank I use $1\frac{1}{4}$-inch square soft steel. These forgings are generally hurry-up jobs and a smith can get good pay for his work.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants to Temper Track Chisels.— Will some brother smith please tell me how to temper track chisels so as to make them stand? J. R. Thompson, Massachusetts.

Wants Information on Buggy Axles.— Will some carriage smith tell me the correct way for setting buggy axles? Should both axles be of the same length? Please explain fully how to do the work correctly.
G. A. Miller, Kansas.

A Shoeing Question.—I would like some brother smith to tell me how he would shoe a horse that is double-gaited and crossfires and forges at the same time. I have almost cured him of it, but not quite. He is a fast and strong mover. L. R. Beohm, Indiana.

Wants a Heating Furnace.—I would like some information and an illustration of a furnace suitable for heating cultivator shares or shovels, say twenty at a time, to heat to a uniform bright red. I would also like a description of a small drop hammer for pressing shares to shape.
W. C. Lienert, South Australia.

A Question on Wheels.—Is it good practice to put in a piece of leather, if the joint in the felloes is too loose, so that the wheel will not dish too much, or will it loosen the spokes at the hub? How much draft would you give a buggy tire? How loose should the felloe joint be with all the spokes up tight on a buggy wheel?
E. A. Mountain, Quebec.

Wants Rubber Tire Information.—I would like some brother smith who has had experience in re-tiring rubber-tired buggies to give me some information on the subject. Should like to know something regarding the draw, if any, and, in short, all that is necessary to do a good job of putting on new tires. Would also like to know what tools are necessary.
R. Elmo Harris, Tennessee.

Wants to Repair a Church Bell.— I would like to ask through the columns of "Our Journal" whether any craftsman can tell me how to put into good condition a church bell which is cracked on two sides and has a very poor sound. Which will be best—to bore a few holes and rivet a brass plate to it or a steel plate?

I can tell you, brothers, that I read all kinds of papers, but The American Blacksmith I like best for it is an "Indispensable Helper" to me and I am very fond of reading it. G. Schrade, South Australia.

A Few Ohio Prices.—I run a general shop in Southeastern Ohio. There is no other shop in the village. I make a specialty of shoeing and have all the work I can attend to. The following are a few of my prices:

4 new shoes, plain	\$1.20
4 new shoes, toed	1.40
4 old shoes	.60
Bar shoes, per pair	1.00
Shoes with toe weight, per pair	1.00
Neverslip, for 4 shoes	2.00 and up

Other prices in proportion.
F. S. Tuttle, Ohio.

A Question on Babbitting.—We ran babbitt around a $2\frac{3}{4}$-inch shaft in a solid box 14 inches long. We centered the shaft, wrapped two thicknesses of newspapers around it and ran the babbitt, allowing it to get perfectly cold, and then tried to get out the shaft. It was so tight that we had to drive it out with a 10-pound sledge and came very near not getting it out at all, as driving the shaft swelled the end so it became too large. Was this the proper way to go about this job? If not, would like someone who knows what he is talking about to tell us how. W. B., Missouri.

A Question on Shoeing.— Can any brother smith tell me how to shoe a horse to prevent him from dragging his hind feet? The horse not only cuts the clip off the shoe, but wears away the toe of the foot as well. I can prevent him from wearing out the toe of the foot by putting a steel clip up the front of the foot, but that does not prevent him from dragging the foot, and in a few days he has the clip completely worn off. I have to re-shoe him and keep on doing so as soon as the clip is off, to save his foot. So what I really want to know is some method by which I can shoe him to alter his action and so make him walk naturally again.
Harold R. Denize, New Zealand.

A Word on Oxy-Acetylene Welding.— Since the company purchased their oxy-acetylene outfit I have had fairly good success on cast and wrought iron. I have welded several coils that tested to seven hundred pounds, cold water test.

As to cast iron, any and all small part are reclaimed and pumps which otherwise would become scrap are reclaimed, but as to brass welding I found it very difficult. When working on brass I found it porous, all full of holes. It was strong, but would not do on pump work or for anything that had to stand pressure. I had been using

white sand and raw borax. I later tried boiling my borax, then powdering it, with good results. L. SCHULTE, Ohio.

He Is Very Much Pleased.—I have had several copies of different journals sent to me, but they do not compare with THE AMERICAN BLACKSMITH in helping the small shop as well as the big shop.

Among many other things I notice you get after the fake advertiser.

I carefully watch for every tool that comes out to help the trade along, because I find that they soon pay for themselves and make money for me.

I have already, since I received my first copy about two weeks age, sent for catalogues for two articles advertised in "Our Journal." So I am now much interested and will look forward to receiving my next copy. W. H. EVANS, Ontario.

Proper Size Lathe for Automobile Repair Shop.—In a recent number of THE AMERICAN BLACKSMITH, in an article suggesting the proper equipment for an automobile repair shop I noticed that one of the requirements was a 20-inch lathe, and while I do not wish to criticize the judgment of the person who wrote the above article I do not quite agree with him in reference to the size lathe needed by the automobile repair shop. It is true that a 20-inch lathe would be a good lathe to have, but when you take into consideration the excessive cost of a lathe of this size, its use by the average blacksmith equipping an automobile repair shop is almost prohibitive, and I doubt very much whether he would have enough use for a 20-inch lathe to even contemplate installing one. I think an automobile repair shop would find a 15-inch lathe of ample size to do most of the work that would come to it, and this is the size that the writer would recommend. The cost of the average 15-inch lathe does not put it beyond the reach of most blacksmiths going into this line of work, and I believe that most of the readers of this article will agree with me when I say that the cost of a 20-inch lathe does. E. E. S., Ohio.

Some Straight Talk from Illinois.—As soon as "The Journal" arrives I turn to the letters from the brothers, and it is here where I find much to interest and amuse me. Allow me to say that I find many practical suggestions of different ways of doing work that bring good results, and I always make a point to try any method that looks good to me. I also find other letters that are amusing. The statements of fast shoeing remind me of the exhibition of shoe-turning that the boys used to give in old Battery D in Chicago years ago. A number of forges were put up and the boys would try and see which could turn the most shoes in one hour's time. They often turned from seventy-five to ninety shoes in that time, but, like all fast work, the shoes were good only for the scrap heap.

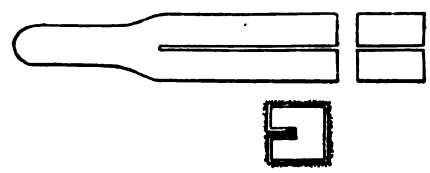
Another brother makes the statement that the worse workmen he ever saw were men who had served their time or an apprenticeship of three years or more. This brother then goes on and asks the craft how they weld a toe calk on and have it stay welded while drawing it out sharp. The fact that he finds it necessary to ask a question which the man who has served his apprenticeship does not, confirms the belief that he is as good a workman as the other.

Another brother states that he learned the trade in the good old way of "If at first you don't succeed, try, try again." He also stated that he never worked for any other man and tried to give the impression that he was the best man in his locality. It is fortunate for this brother that he has his own shop, for if he worked for another man and his "try-try-again" plan proved a failure he would have to come back to his own place to get work.

Then we come to the latest brother who would have us take three welding heats to get an axle welded so that it would neither break nor come apart. After an experience of twenty years in all kinds of shops this is the funniest advice I ever heard of on axle welding. Should this brother come to this place, or any of the factories in this locality, where thousands of axles are welded every year, he would be much surprised to learn that much good welding compound is used and that the axles are welded with one welding heat.

Come on, brothers. Let us hear from you often. Tell us of the fast stunts you have done in the smithing line, for we enjoy reading them, even if we do not always believe in them. C. M. MARTIN, Illinois.

A Handy Holder for Emery Cloth.—Take a piece of hard wood 1¾ inches square and saw a slit in it the length of a sheet of emery cloth. Shape up the other end like a handle. Now fold your emery cloth, as shown in the engraving, and then



A HANDY HOLDER FOR EMERY CLOTH

slip it onto the stick, allowing the ends of the cloth to slide into the saw cut. This will hold the cloth firmly and make it more convenient to handle. W. B., Missouri.

Answers to the Ten Questions on Page 301 of the September Issue:

1. Steel should be heated carefully, slowly and evenly.

2. (a). If steel be treated too quickly you will burn the surface and, to say the least, you will not get an even heat (solid heat), as the heat will not penetrate the metal.

(b). If the object is to work the steel when it finally reaches the proper heat for forging the result is practically a waste of time, no great damage having been done to the metal. Heating too slowly tends to anneal the steel and so we can say that heat will cause metal to oxidize and at a certain heat—1600 degrees or more (Fahrenheit)—it will oxidize rapidly, and the oxide scales will form and burst off, reducing the size of the part heated. But these are minor things if the effect or intention is to forge the steel.

3. It will crumble under the hammer. This will happen in any steel that contains carbon enough to harden it Soft steel would show the effect of over-heating, i. e., break off in pieces and fall apart. In any case the metal has begun to fuse (its nature is changing) and it begins to separate in clusters of molecules.

4. Silicon Flux. This is used to retain the heat and assist in getting a solid heat. It must not get in a weld.

Borax Flux. This will retain the heat somewhat and is a cleanser and purifier and destroys oxidation. Keep a clean fire and you are safe with this flux. Can be used any time on any metal in tight joints and on all steels that can be welded.

Compounds. Borax has that important place in compounds, fighting oxidized matters helped by other purifying chemicals. Little wires are used to fuse at a lower temperature and thereby cause the metal to adhere at a lower temperature.

5. It depends upon the stock and the hammers. It will affect the surface, make impressions, and the desired forging cannot be obtained by this method. There is no great injury to the metal.

6. As a good union cannot be made unless the scarfs of the metal are clean we find it very essential to convex the scarfs so that they will force out the impurities (should any be caught on the scarf), whereas if concave it will hold cinders and make a bad weld. Often the metal will not adhere even on the edges.

7. Melt it, add the properties that have been destroyed, get the atoms and molecules back to the same attraction; in substance a new piece of steel is wanted. A mixture of borax, sal-ammoniac, prussic potash, resin and alcohol, simmered to a consistency, used early, will help it.

8. Tool steel is a good grade of steel and there are several grades of it, containing from 0.90 to 1.25 per cent of carbon. Tough, compact, with few impurities, it can be hardened, given any temper, but must be worked at a comparatively low heat and carefully.

9. Heating steel red hot and suddenly cooling it will in some steels give you the right temper for certain purposes, but this process would be called hardening. Heating red hot and cooling slowly is the tempering process for some steels. In either case it depends upon the heat and the amount of carbon the steel contains.

10. (a). Wrought iron is not as pure, tough or compact as machine steel, the molecules being of a little different nature, containing more impurities and less attraction.

(b). They weld at about the same temperature and neither can be tempered.

J. AMOS DAVIS, Maryland.

Plow Work and Shop-Made Tools.—In answer to Mr. Fred H. Pettit regarding Mr. S. E. Frazzle's question about welding up a plow lay. His inquiry concerned a new lay he was fitting. It was not supposed to be burned nor were any strips of iron in it. Anyway, what I said I thought good advice. The first one I welded I probably had some trouble with, but after I started a shop of my own I never took one in to fix and got stuck, nor had to call on someone to tell me how to weld it, for I never could keep it in my shop that long. I have welded lots of them and I find one is almost compelled to put in a strip of iron, so that when they are welded there will be enough material in the landside when finished. All the information I ever saw in the paper was to get the proper heat, and strike at the right place and time. As Brother Pettit knows, there are lots of fellows running shops that have no business with one and cannot do a good job of any kind. They can never learn if they work at it for three hundred years, and anyone that is running a shop that cannot weld on a landside should quit or hire a good man and learn the business. Then we would not have so many cheap skates to compete with and to keep prices down.

Mr. J. R. Dowd wants to give the young smiths a slash and says the man that can't make every tool he works with is no good. I would like to stand back, as Mr. Pettit says, and watch him pound out a good, 6-horsepower gasoline engine or a nice little cold disc roller, or an electric power blower, or a set of screw plates, or draw out a few band saw blades, or a nice steel planer head all balanced up with blades and bolts, or pound out a nice 200-pound anvil. I have seen a few of these homemade tools, such as trip hammers, band saws, lathes, blowers, emery stands, disc sharpeners, and by looking them over very closely one can almost see that they were not made at the factory; and if a man's time is worth anything I should think he would owe a little money besides his time turning spokes

and hubs if the timber were donated, as a man can buy a hub finished for forty cents and it would be worth fifty cents to mortise it for the spokes. A man might as well undertake to reap wheat with the old hand sickle and flail it out so as to break up the harvester trust as to turn hubs and spokes in the country blacksmith shop. Times have changed in the last forty years. Did you ever hear of a man spending one dollar to save five cents? G. B. JEWETT, Nebraska.

An Interesting Letter from Canada.—In the June number of "Our Journal" Mr. G. E. Settles writes on "The Other Side of Blacksmithing." I must congratulate Mr. Settles on that article. I had a good laugh over it and so much of it is only too true, for I have worked for farmers myself, and sometimes when they are paying up their account, after it has run six months, a year or perhaps two years, you almost need to know who brought the job to the shop, where they stood in the shop while the job was being done, what kind of a day it was and if it was A. M. or P. M. And then after going to all this trouble and having no witness to swear to it you will have to let it go and give them the job for nothing. I am in the city now and like it much better. But, come again, Mr. Settles. I am sure we all enjoyed your article, and they say a good laugh is as good as a dose of medicine.

Now a few words to Mr. Chas. J. Latter, of New South Wales, Australia. He writes an article in the June number which I enjoyed very much. I am from Canada, as I see you ask in your letter if all our vehicles in America are factory made. In Canada we have a lot of factory carriages, but I am sure the States have far more. Some places in Canada you will run across lots of hand-made vehicles, but I believe they are getting scarcer all the time. I think the automobile is quickly doing away with the horses in the States and to some extent in Canada, but east as far as Montreal we have such cold winters with so much snow that the motor truck is not of much use in the winter. We have a lot of horses and horse-drawn vehicles here and I am glad to tell you that most all carriage work is hand made, and some very fine work, too. There is a large amount of cab work done here which has a lot of particular forging, such as dash rails and seat rails, which are nickel or silver plated.

Now you claim you are about fifty years behind the smiths of America; that is, your country or small city shops. Well, you may be in some ways, and still there are lots of smiths whom you would think fifty years behind you if you would ask them to do your class of work, or if we would run some of them into a large shop where almost anything you might think of was hand forged. Did you think that a terrible lot of blacksmiths and some horseshoers from small country shops are not much more than iron fitters today? People are losing the art of forging and shoe turning, and I think that when you take that out of the blacksmithing line there is not so much left. I consider the blacksmiths here in Montreal and the horseshoers, too, 'way ahead of most towns and cities. We turn lots of shoes, and forge by hand fifth wheels, forgings on reach plate for fifth wheel, forgings for braces, steps, whiffletrees and, in fact, everything. If you wanted a spring for buggy or wagon I think you could get that, too. I will soon send a few drawings of dash rails, seat rails for cabs, and hope that something that I have said will be of some benefit to my brother readers.

C. CRAIG, Ontario.

Bending Crank Shafts Hot or Cold?—I had a crank shaft to straighten. A machinist argued with me that by heating it I drew the temper and that it would never be so good as it would be by straightening it cold. Now, I never had occasion to test anything like that and never knew that they were tempered, as I never had a piece of one that I could temper. I told him that if he had a punch that bent in use, if he straightened it cold it would bend easily again, but if you heat it and straighten it, it will not. Of course, heating softens it some, but stretches it one way and upsets it the other. This can be seen by bending a piece of steel cold, then straightening it cold and then tempering it. It will spring the way it was bent, showing that there was a strain. He said a heated crank shaft or auto axle would be in the shop to be straightened again quite often.

Now, I have straightened lots of axles or crank shafts and never had occasion to do it again on the same machine and have lived next to a machine shop and never saw one but that was heated, and by lots of good machinists, too, and never heard of one being done cold. In your last paper I notice that they heat them. Now, who is right? I think it is less apt to spring when heated than it would be cold.

C. ISAACS, California.

More Light on Tire Setting.—Let me add a few lines to this cold tire setting argument. Mr. Shay, of Pennsylvania, says that he is willing to admit that he cannot set a tire tight with a cold tire setter. I am glad to know that I am not alone in this idea. Mr. J. W. Jeffries, of Missouri, says that he set twelve hundred tires in 1910, and devoted not more than twenty minutes to the set. Now, he may have tightened them, but he did not "set" them. The meaning of "setting a tire" is not just to tighten the tire so that it will not rattle as you drive along. It is necessary first to get your wheel ready, then set your tire. To get it ready, first take off your tire, then wedge every tenon and draw the rim down solid on the shoulder of the spoke. Then saw out your wheel until the end of the rims will just pass each other—a fine saw cut is opening enough. Then cut the ends of the tenons off, so the tire will not rest on the end of the spoke. Then make your tire the size of the wheel with the heat in it; put it on and bolt them up. You will have a wheel that is not dished any more than when you started, and still it is set and the life is still in it. It is not dead like one drawn up with a cold machine, and Mr. Jeffries will not be turning out a set every twenty minutes, but can say with honest pride, "There is a set of wheels that I set and I know they are right."

JAY JACOBS, Iowa.

Setting Tires by Hand or Machine.—I have just been reading the July number of THE AMERICAN BLACKSMITH and notice many good articles upon the various subjects, and so far, myself, have never cast in my mite of experience, but I am going to give you my opinion upon the subject of tire setting.

Before me is an article upon tire setting, contributed by Brother Huff, also another by Brother E. E. Smith. Brother Huff says that he can not do a good job of tire setting with his cold tire setting machine, while Brother Smith takes the other side. Now I am going to play the role of critic and in the beginning say to these brothers, "Keep cool"; not once in my opinion have either of you reached the point or struck the right chord. The main issue is not so much the "method" employed as it is the results obtained.

I never was a crank on method. Now, Brother Huff, when God gave you a brain it was for the purpose of putting you in a position to be able to solve and master just such problems as these which are being discussed, and the men who manufacture cold tire setting machines expect the operators of those machines to use those brains. It is a safe conclusion that if the operator does this he will be able to do better work.

And now, Brother Smith, I notice that you make the assertion that you can set four buggy wheels in the space of but twenty minutes. I wish to say to you, in all candor and as a brother, that you can not do it and do justice to the customer and the wheels which you set. Naturally, I must give my reasons for the statement. This I will endeavor to do:

First, at least three out of five wheels which require the tires set are also in need of wedging and possibly other minor repairing.

Second, it is more than useless to set the tire on a wheel in which the spokes are loose in the rim. It makes no difference whether they are set cold or hot.

The point I would make here is this: Does it pay to invest so much money in a cold setting machine when, as I claim, three out of five wheels must, or at least should, have the tires taken off and the spokes wedged? But some may say that it makes no difference, just so you save the time and do the work in the least possible time, thus making more money. To this I would say that it does make all the difference in the world, both to yourself and to the man who is getting the work done. I have always tried to gain and to hold the confidence of my customers.

I am fifty years old and have been at the trade thirty years and in this town twenty-two years. I enjoy the patronage of many of my first customers today. But, brothers, years do not count so much as does the way we use our time. Some people live more in a day than others do in a year.

M. W. ARMOUR, Kansas.

Some Smithing Thoughts and Experiences.—On reading the article by Charles Chism, which appeared in the July issue of THE AMERICAN BLACKSMITH, the writer has been furnished with food for further thought.

Talking of the honest blacksmith—is a blacksmith honest who allows himself to be imposed upon as Mr. Chism admits he has? Using his own quotation, "it only takes a man with a weak mind and a stiff back to be a blacksmith." The thought that here strikes the writer is that Mr. Chism is a fair specimen of that class of individual when he voluntarily offers his material, labor and skill at forty cents per hour, then comes down to making a spring worth $2.50 for a paltry thirty cents and, to wind up, complains of being imposed upon.

It is, to say the least, humiliating to the craft in general to have to admit that men of the type of the writer of the article in question are so much in evidence.

Men who will let themselves down so small for the sake of thirty cents and the keeping of a customer who is not worth having are neither honest to themselves, their competitors, nor to the ancient and honorable occupation at which they eke out a livelihood (or would it be more correct to say existence)? Probably men of the Chism type would be benefited to some extent by the installation of foot-warming devices in their places of business.

Tradition tells us of only three smiths who were ever consigned to Hades. One attempted to work cold iron, one used hot tongs and the other charged too little for his work. Were such things again to come to pass it is too horrible to think of the fate that is likely to overtake the weak-minded, faint-hearted class who do not have the courage to turn down a customer who barefacedly imposes upon them.

Honesty, like charity, begins at home, and the smith who has enough sand and backbone to stand up for his own rights and interests will have the full respect of his customers and competitors.

A. READER.

How to Sharpen Lawn Mowers.—Brother Hildreth of New York has asked for information relative to the sharpening of lawn mowers. It is considered by many to be disloyal if one divulge the secrets of his trade, but sharpening lawn mowers is not a part of my trade so I feel myself honorably acquitted of any charge of the kind which may be brought against me.

The blades of a lawn mower consist of several spiral pieces firmly attached at both ends to circular pieces, so that they all revolve together, each of which in its turn strikes a stationary blade for its whole length as the blades revolve. These revolving blades are so adjusted as to strike the stationary blade with some friction. The mower is arranged so that the grass is caught between the revolving and the stationary blades and pinched off but not cut. Now all that is necessary when a mower refuses to do good work is to adjust the set screws on each side so that the revolving blades rub against the stationary one closely at every point and the blades will thus sharpen themselves. If a file is put on the blades the file cannot be held true enough to get a uniform edge and the consequence is that gaps are left in the blade which permits the grass to pass through untouched.

Now the way to sharpen a lawn mower is this: tighten the set screws so that each revolving blade rubs firmly against the stationary one at every point, take the mower out in the grass and run it up and down a few times or shine it up in some way so as to give it the appearance of having been filed. Then, when the man comes for his mower, charge him a dollar or so. The last part is the most important.

B. A. HICKEY, New Jersey.

Doesn't Favor Cold Setters.—I notice three more articles in the July number on cold tire setting. Mr. Shay has the proper dope which a great many have found out to their cost as they have already put their money into a machine that they find is useless. It is of course impossible to make a tire smaller than the wheel without kinking the iron or damaging the felloe in some way. It would be quite a trip for some of us to make to go back to Mr. Jensen's shop in Iowa just to find out what we can find out at home; that his machine is no good. But he claims that it suits him. He may have a prospective buyer. Some of the rest of us wish we had also. I do not know of one good mechanic, or anybody who cares anything about the good reputation of his work who uses a cold tire setter, but I do know of several who have used them and have them setting outside some place with a "for sale cheap" sign on them. Mr. Jeffries of Missouri must have a class of customers very easy to satisfy if they will stand for what he claims he does—four tires set in eight minutes; it is to grin. Mr. Jeffries is to be congratulated on being the proud possessor of a 38-acre farm because he will surely need it if ever a good mechanic takes a notion to stop over in his town for any length of time and go into business. My advice to any brother smith who is on the fence is to stick to the old hot setting machine or cut and weld them (which is really the best way on a hind wheel if a brake is used). Twenty-eight years' experience, and I have tried it all, has taught me this.

J. W. SMITH, California.

Price List of Garfield County (Col.) Association of Blacksmiths and Horseshoers

(Part 2)

Rims, Bent, Buggy, 1-inch, per pair	$ 3.00
“ “ “ 1⅛ to 1¼, “	3.25
Rods made up, per lb., minimum	.12
Sand Boards, irons replaced, 2½, 2¾, 3 and 3¼	4.00
Sand Boards, irons replaced, 3¼, 3¾ and 4	4.50
Sand Boards, new irons, complete, 3¼, 3¾ and 4	5.50
Sand Boards, new irons, complete, 2½, 2¾, 3 and 3¼	5.00
Scraper Shoes, Silo, per pair, min.	2.00
“ “ Mormon, put on, per pair	3.00
Scraper Blade, new, for Mormon Scraper	3.50
Scraper Board, put in	2.50
Scrapers, Road, grader, sharpening	4.00
“ Handles, per pair	1.50
Sections, putting on sickle bar	.75
Shafts, Buggy, (put in), single shaft	2.50
“ “ “ (long heel)	3.00
“ Express	3.00
“ “ Double Bend	3.50
“ Black Hickory, complete, Hand made	7.00
Shafts, Black Hickory, complete, Factory made	5.50
Shafts, Tips, put on	1.00
“ Irons, welding, each	.75
Shackles, Shaft, put on, per pair	1.50
“ “ “ ⅝ and over	2.00
Sickles, welding, each	.75
Singletrees, Buggy, each	1.25
“ “ Factory Ironed, each	1.00
Singletrees, Wagon, Ironed, Second growth, Hand made, each	1.50
Singletrees, Wagon, Ironed, Factory made, each	1.25
Singletrees, Hooks, Premium patent, per set	1.50
Singletrees, Plow, 24 to 30 inches, Factory made, per pair	1.50
Singletrees, Plow, 24 to 30 inches, Hand made, per pair, First growth	2.50

SKEINS

Skeins, Wagon, Steel, 2¾ and 3-inch	14.00
“ “ “ single one, 2¾ and 3-inch	4.50
Skeins, Wagon, Steel, 3¼ and 3½-inch, per set	16.00
Skeins, Wagon, Steel, single one, 3¼ and 3½-inch	5.00
Skeins, Wagon, Cast 2¾ and 3-inch per set	12.00
Skeins, Wagon, Cast, single one, 2¾ and 3-inch	3.50
Skeins, Wagon, Cast, 3¼ and 3½-inch, per set	14.00
Skeins, Wagon, Cast, single one, 3¼ and 3½-inch	4.00
Spokes, Buggy	.40
“ single one	.45
“ Wagon, 1¾ and 2¼-inch	.40
“ “ 2½ and 3¼-inch, minimum	.55
Single Spoke, 5c extra.	
Springs, New (not put in), per lb.	.15
Springs, Leaves, making new, single leaf, minimum	.35
Springs, Leaves, making new, main leaf, minimum	1.75
Springs, Welding, per leaf	1.00
“ Wagon Seat, 2-leaf per spring	1.25
“ “ “ 3-leaf, “	1.50

Spring bars, Buggy, Express and Delivery	$ 2.50
Spring bars, Buggy, Plain	2.00
Spring bars, Surrey	2.50
Stay Irons, Pole, welding, each	.75
Steel, Octagon Tool, per lb	17½c
Stretchers, complete	5.00

TIRE

Tire, Buggy, 1 x ¼-inch, per set	12.00
“ “ 1⅛ x 5/16-inch, “	14.00
“ “ 1¼ x ⅜-inch, “	15.00
“ “ 1½ x ⅜-inch, “	15.00
“ Wagon, 1⅜ x 7/16-inch, “	15.00
“ “ 1½ x ½-inch, “	16.00
“ “ 1¾ x ⅝-inch, “	19.00
“ “ 2 x ⅝-inch, “	20.00
“ “ 2 x ¾-inch, “	24.00
“ “ 3 x ½-inch, “	20.50
Tire, Setting, Buggy, per set	4.00
“ “ Channel, each, minimum	1.00
“ “ Wagon, up to 2 inches, minimum width, per set	4.00
Tire Setting, Wagon, up to 2½, 3 inches, minimum width, per set	4.50
Six Cents, per lb. for all new tire, $2.00 per tire for putting them on.	
Tire, Setting, Wagon, single, up to 2 inches, minimum width	1.00
Tire Rubber, Cushion, per lb	.65
“ “ “ per tire, putting on	1.50
Tire, Solid, Rubber, ¾-inch, per set of four	20.00
Tire, Solid, Rubber, ⅞-inch, per set of four	22.00
Tongue Caps, Wagon, (put on)	1.00
“ Wagon, 2¾, 3¼-inch	5.00
“ 3½, 4¼-inch, min.	5.50
“ 4½-inch or over	6.00
Wagon Bows, per set	1.50
“ Box, Hand made, complete, Farm Bottom Bed	21.00
Wheels, Buggy, old tire used, 1 to 1⅛ inch, B Grade, per set	23.00
Wheels, Buggy, old tire used, 1 to 1⅛ inch, C Grade, per set	21.00
Wheels, Cutting Down, Wagon with 2-in. felloes, old tire used	18.00
Wheels, Cutting Down, Wagon with 3-in. felloes, old tire used	25.00
Wheels, Riveting, Calif. rivets. per set	1.00
Whip Sockets	.50
Wrenches, Buggy	.35
“ Wagon	.75

HORSESHOEING

Shoes, Machine, per set of four, up to No. 4	$2.00 & 2.25
Shoes, Machine, per set of four, up to Nos. 6 and 7	2.50
Shoes, Machine, per set of four, (resetting)	1.00
Shoes, Machine, Bars, flat, per pair	2.00
“ “ Bars, calked, per pr.	2.00
“ “ Toe Weights, per pr.	1.50
“ “ Side Weights, per pr.	1.50
“ Hand made, Trotting and Pacing Plates, minimum price	3.50
Shoes, Hand made, Bars, per pair	3.00
“ “ “ Side Weights, per pair	2.00
Shoes, Hand made, Toe Weights, per pair	2.00
Shoes, Running Plates, per set of four flat or calked	3.00

NEVERSLIPS

Shoes, Neverslip, per set of four, up to No. 3, $2.50; Nos. 4 and 5	3.50
Shoes, Neverslip, per set of four, Nos. 6 and 7	4.00
Shoes, Neverslip, Calks put in, each	$.05 and .08
Rubber Pads and Shoes, per pair, complete	3.00
Leather and Packing, per shoe	.50

TIMELY TALKS WITH OUR SUBSCRIBERS

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The following jobbers are now selling American Blacksmith Subscription Coupons (other jobbers will be named as soon as arrangements can be completed):

Shattuck-George Iron Co., Wichita, Kan.
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Association Secretaries

Arrangements will also be made with the secretaries of the larger associations to handle American Blacksmith Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

No Time to Succeed

How often we hear a man say he has no time for this, that or the other thing, and we even hear it in connection with their craft journal. "I have no time to read."—No time to improve—to learn—to save; no time to find out what my trade is doing—no time to keep my knowledge of my trade alive and growing—no time to learn how to keep my business prosperous and growing. That's what it means. And if we dig down beneath the surface we will very likely find such men spending time where it will do them little or no good. The five or ten minutes before the whistle blows, the spare time at evening, the hundred and one other times when a man's hands are idle [illegible] the times when he can work with his brains to [illegible]e best advantage [illegible] to read is [illegible]ke saying, "[illegible] no time to succeed."

Contents, December, 1911

As a Saver of Money

A paper may be practical, may be well written, may be valuable, yet not be an actual saver of money. The American Blacksmith is all of these and more. Here's an extract from a letter written by an Ohio subscriber. He says: "The paper is well worth the price. The first issue I received saved me $20.00 on one item of shop-equipment alone."

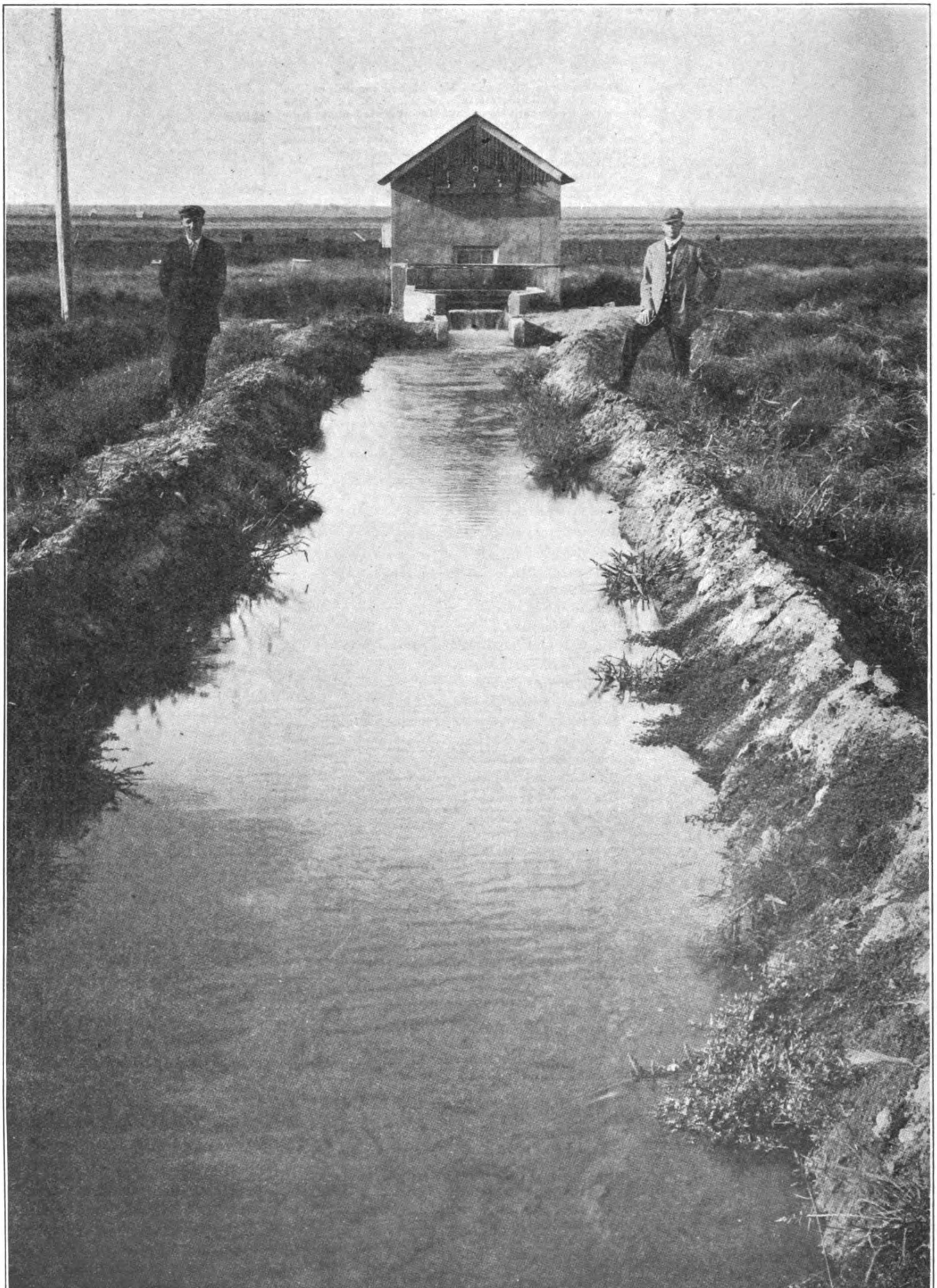
That's real money saving. Did it pay that man to subscribe and read the paper? One issue alone saved him enough money to pay for a twenty-year subscription. One issue made more for him than a smith ordinarily makes in a couple days' hard work. Does a paper like that pay?

Tell your neighbor about this. Get his order for a year's subscription. We'll give you six months' subscription credit if you do.

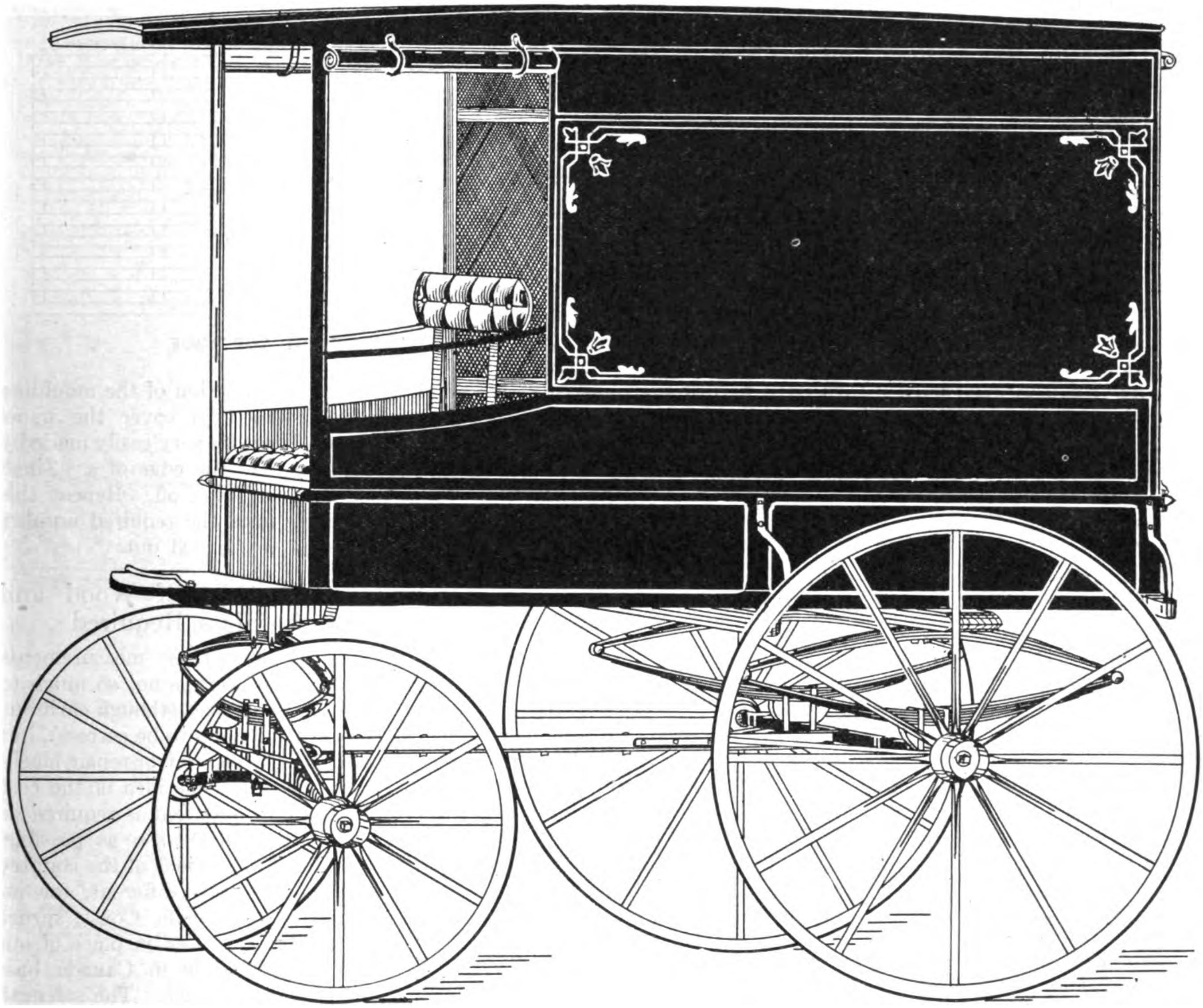
Did You Order Some?

There are still a few 1912 calendars left for those who have been prevented from ordering earlier, but if you don't order now you are likely to be disappointed. The calendar this season is just about the best we have yet published, the subject is perfect, full of life and being on heavy cardboard makes a calendar that you will be proud to call your own. Your customers will gladly give it a place of honor in their homes.

We are able to deliver calendars in about five days after receiving order, so you need not be afraid that your calendars won't come in time for your needs. Send your order now. We cannot guarantee delivery unless we hear from you immediately. So order now if you want to present a calendar to each of your customers. Sit down right now and write out your order for some of these calendars. You will never regret spending such a small amount to bring you such an increase in business.



HOW THE AMERICAN FARMER IS TURNING THE AMERICAN DESERT INTO A GREAT AMERICAN GARDEN



How to Build a Light Delivery Wagon With Paneled Top

J. L. HILL

THE style of tops shown is chosen out of many for its simplicity of construction; the timbers used in its construction, with the exception of the roof and toe board, being straight, the arch of these being very slight and easily cut with an ordinary rip saw.

Fig. 1 shows the construction and frame work of the sides. This view will enable the builder to readily understand the construction of the top and save both time and material. The top rail K extends 11¾ inches in front of the forward pillar O. W is the only piece that connects the ends of the standards. This piece does the duty of a seat slide and, also, panel T, having no support at the top, stiffens this at the bottom. The space between O and N is 20¾ inches and from N to M is 57½ inches. The height of the top (from T to K) is 45¼ inches. The height of the body or box (Fig. 6) being 10¼ inches makes the total height of wagon top from bottom of box to roof 55½ inches. The top being entirely independent of the body allows for the wagon being used in two ways. The top is secured to the body by strap bolts, as shown on the right of Fig. 4, and by corner plates, as shown in Fig. 5.

Fig. 2 is the plan of the bottom of the body. From C to B it is 6 feet 8 inches and from A to A it is 4 feet 6½ inches, making the box 3 feet 4 inches on the inside. A is mortised into B and is flush on the top side. C is mortised into A and is shown in section in Fig. 6. The panel is fastened by screws to the sill and in like manner the top rail to the panel.

The dotted lines at C and B, Fig.

2, indicate the ends of the bottom boards. The cross bars C and B should be cut out along these lines to the thickness of the boards, so as to have the top surface of the boards level with the top of the sills and bars. E E, Fig. 2, are bolted under the sill as shown in Fig. 6. D is also cut out like E, this method giving a good solid bearing for the bottom boards. The toe board X is cut on a bevel at the ends as shown at Fig. 5, and a 3 x ⅙-inch plate is screwed on top of the joint made by the toe board and sill. These plates keep the board and sills together and take up the wear.

Fig. 3 is the plan of the roof. K is a top view of K in Fig. 1 and shows how these pieces are cut so as to receive the standards and bows.

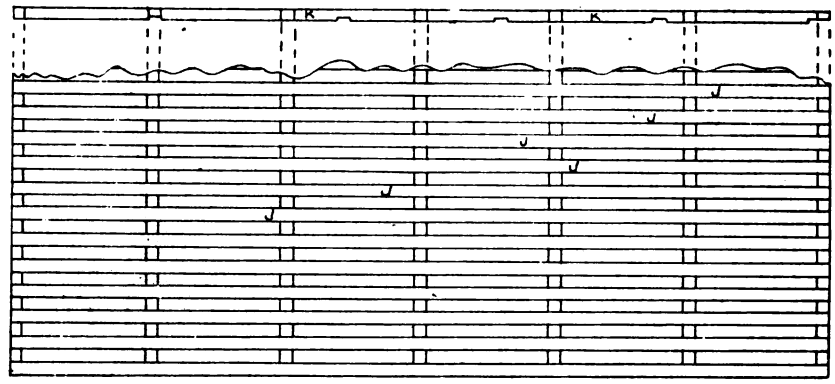
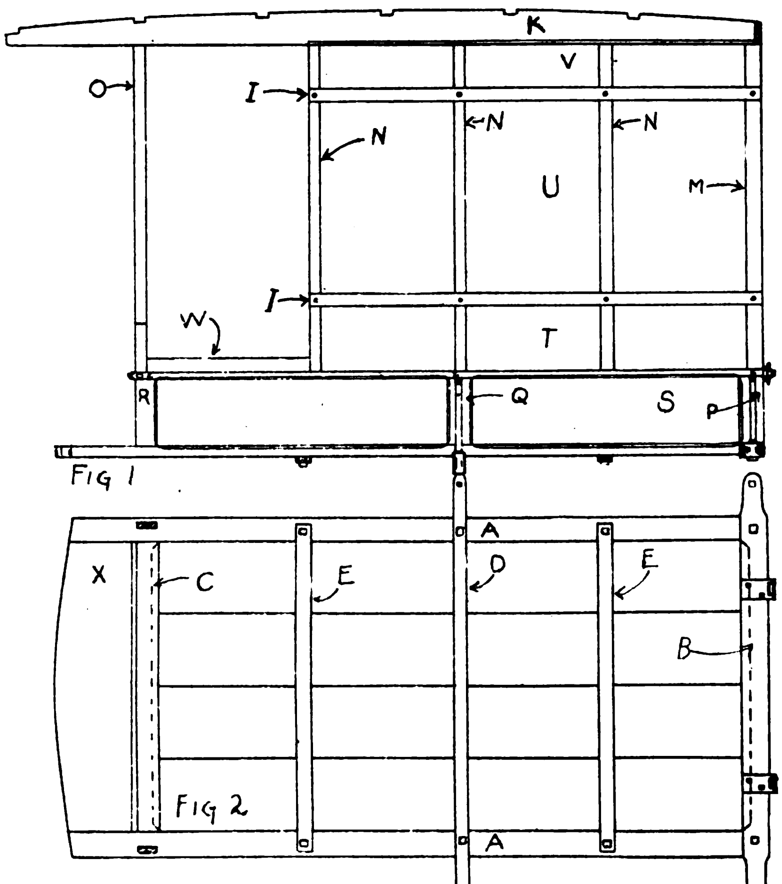


FIG. 3—SHOWING A PLAN OF THE TOP ROOF



FIGS. 1 AND 2—SHOW SIDE VIEW OF TOP AND A BOTTOM VIEW OF THE WAGON BOX

The side view of the front pillar O is shown in Fig. 5. The cut-out at the bottom is for the panel and is ⅜ of an inch deep by 6 inches long. The side view of the other pillars can be seen in Fig. 4. In this latter view the frame only is shown on the right hand side. This shows the cut-outs for the side slots as shown in Fig. 1. On the left hand side the panel is shown on the frame. Make the end of the panel slightly round, as this makes a good finish and, if the joint between the panel and standard should crack through the paint, it is not as likely to show.

Fig. 7 is the plan of the front corner pillar R. It requires a bit of hand work to get it out of a 2¾-inch square block. But the time is well spent, for it makes a very strong and neat corner. The rabbet is for the panel to fit into. This pillar should be tenoned through the sill A and into C about ½ inch. The back pillar P is stub tenoned into B and rabbeted out for the panel the same as Fig. 7.

Fig. 8 is a section of the moulding which is used to cover the panel joints. It can be very easily made by rounding over the edge of a ⅝-inch board and ripping off. Repeat this operation until the required number of pieces are turned out.

Complete List of Wood and the Sizes Required

In compiling these measurements the writer's desire is not so much to give the exact sizes (though each one can be relied upon to be correct), but to enable the country or repair blacksmith to form some idea of the cost of material, and what is required so as to have as little waste as possible.

In different sections of the country the wood used is different, for instance, on the Pacific Coast, spruce or sugar pine is used in place of our white wood, while in Canada bass wood takes its place. The strength of these timbers varies, but for this particular purpose the measurements given will answer for each kind.

Sill A, 2 pieces 3 by 1¼ inches by 4 feet 6 inches, ash.

Back Bar B, 1 piece 3 by 1⅜ inches by 4 feet 6 inches, ash.

Front Bar C, 1 piece 2½ by 1¼ inches by 3 feet 4 inches, ash.

Center Bar D, 1 piece 2⅜ by 1⅜ inches by 4 feet 6 inches, ash.

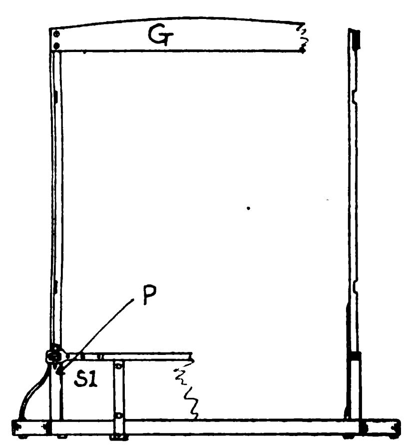


FIG. 4—IS A REAR END VIEW OF BOX AND TOP

Cross Bar E, 2 pieces $1\frac{7}{8}$ by $1\frac{3}{4}$ inches by 3 feet 4 inches, ash.
Top Front Bar F, 1 piece $1\frac{3}{4}$ by $\frac{7}{8}$ inches by 3 feet 7 inches, white wood.
Top Back Bar G, 1 piece $4\frac{1}{2}$ by $\frac{7}{8}$ inches by 3 feet 7 inches, white wood.
Bows H, 5 pieces 1 by $\frac{3}{4}$ inches by 3 feet 7 inches, ash.
Side Flats I, 4 pieces 1 by $\frac{1}{2}$ inches by 4 feet 10 inches, ash.
Top Flats J, 15 pieces $1\frac{1}{2}$ by $\frac{5}{8}$ inches by 8 feet 1 inch, white wood.
Top Side Rails K, 2 pieces 4 by $\frac{7}{8}$ inches by 8 feet 1 inch, white wood.

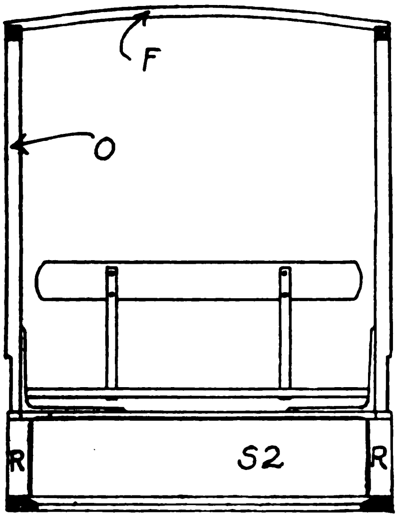


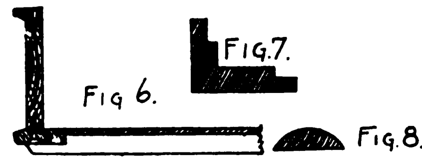
FIG. 5—SHOWING A FRONT END VIEW OF WAGON BOX AND TOP

Top Body Rails L, 2 pieces $1\frac{1}{4}$ by $\frac{7}{8}$ inches by 7 feet, ash.
Cross Body Rails, 2 pieces $1\frac{1}{4}$ by $\frac{7}{8}$ inches by 3 feet 9 inches, ash.
Back Top Standards M, 2 pieces 2 by $\frac{7}{8}$ inches by 3 feet 10 inches, ash.
Front Top Standard O, 2 pieces $1\frac{1}{2}$ by $1\frac{1}{4}$ inches by 3 feet 11 inches, ash.
Center Top Standard N, 6 pieces $1\frac{3}{8}$ by $\frac{7}{8}$ inches by 3 feet 11 inches, ash.
Body Pillars P, 2 pieces 3 by $1\frac{1}{4}$ inches by 10 inches, ash.
Body Pillars Q, 2 pieces 3 by $\frac{5}{8}$ inches by 10 inches, ash.
Body Pillars R, 2 pieces $2\frac{3}{8}$ by $2\frac{3}{4}$ inches by 1 foot, ash.

Bottom Boards, 4 pieces 9 by $\frac{3}{4}$ inches by 6 feet 5 inches, white wood.
Panels S, 2 pieces $8\frac{1}{8}$ by $\frac{5}{8}$ inches by 6 feet 5 inches, white wood.
Panels S, 1 piece $8\frac{1}{8}$ by 1 inch by 3 feet 4 inches, white wood.
Panels T, 2 pieces 10 by $\frac{3}{8}$ inches by 6 feet 9 inches, white wood.
Panels U, 2 pieces 26 by $\frac{3}{8}$ inches by 4 feet 10 inches, white wood.
Panels V, 2 pieces 7 by $\frac{3}{8}$ inches by 4 feet by 10 inches, white wood.
Toe Board X, 1 piece 10 by $\frac{7}{8}$ inches by 3 feet 4 inches, white wood.
Seat Board, 1 piece 16 by $\frac{7}{8}$ inches by 3 feet 3 inches, white wood.
Seat Back, 1 piece $4\frac{1}{2}$ by $\frac{3}{4}$ inches by 3 feet, white wood.
Moulding, Fig. 8, 6 pieces 4 feet 10 inches, white wood.
Moulding, Fig. 8, 2 pieces 3 feet 6 inches, white wood.
Moulding, Fig. 8, 2 pieces 3 feet, white wood.
Seat Slide W, 2 pieces $1\frac{3}{4}$ by $1\frac{1}{4}$ inches by 2 feet, ash.

Fig. 9 is the side elevation of the gear. This style is more easily made than a platform gear, and is also less expensive. By the use of a perch the body can be made lighter, as the pull or draft is transmitted from the front wheels through the perch or reach to the hind wheels, while in a platform gear the pull has to go through the body to the hind wheels.

Fig. 10 is the half plan and shows the form of the axle stays and head block brace. This piece is of flat or half round iron, as the builder may elet', and runs back on both sides of the reach almost to the rear axle. On top of the reach, at the front end, the stay takes the bolt in the center of the spring, which is really the king-bolt. It extends back a sufficient distance to take the bolts of the fifth-wheel brace. At the rear



FIGS. 6, 7 AND 8—SHOWING DETAILS OF CONSTRUCTION

end of the reach a clip plate is fastened, with a straight plate underneath it, through one end of which the clip goes. Fig. 13 explains this more clearly. The reach butts up against the inside of the axle, (thus doing away with a rear axle bed), and should be a trifle thinner than the axle, so that when the clip and bolts are screwed up, the plates bind firmly on the axle and keep the reach in place. The front end of the reach is mortised into the head-block, level on the bottom.

The fifth-wheel is of the Derby pattern, or it can be easily made by a mechanic. To do this, take a piece of $\frac{5}{6}$ x $\frac{5}{8}$-inch iron and bend it around a 14-inch circle a little more than half way, for the bottom half. Drill $\frac{5}{16}$ inch countersunk holes each side of the axle and fasten on with bolts and a yoke through the top; a $\frac{1}{4}$-inch bolt in each end of the head-block and one in the reach will be sufficient to secure it firmly. Whether the fifth-wheel is home-made or not, the top and bottom stays are the same as shown.

The bottom stay, Fig. 14, is made with two braces, so as to have it strong enough. In the writer's experience the single stay is a source of considerable trouble, unless made

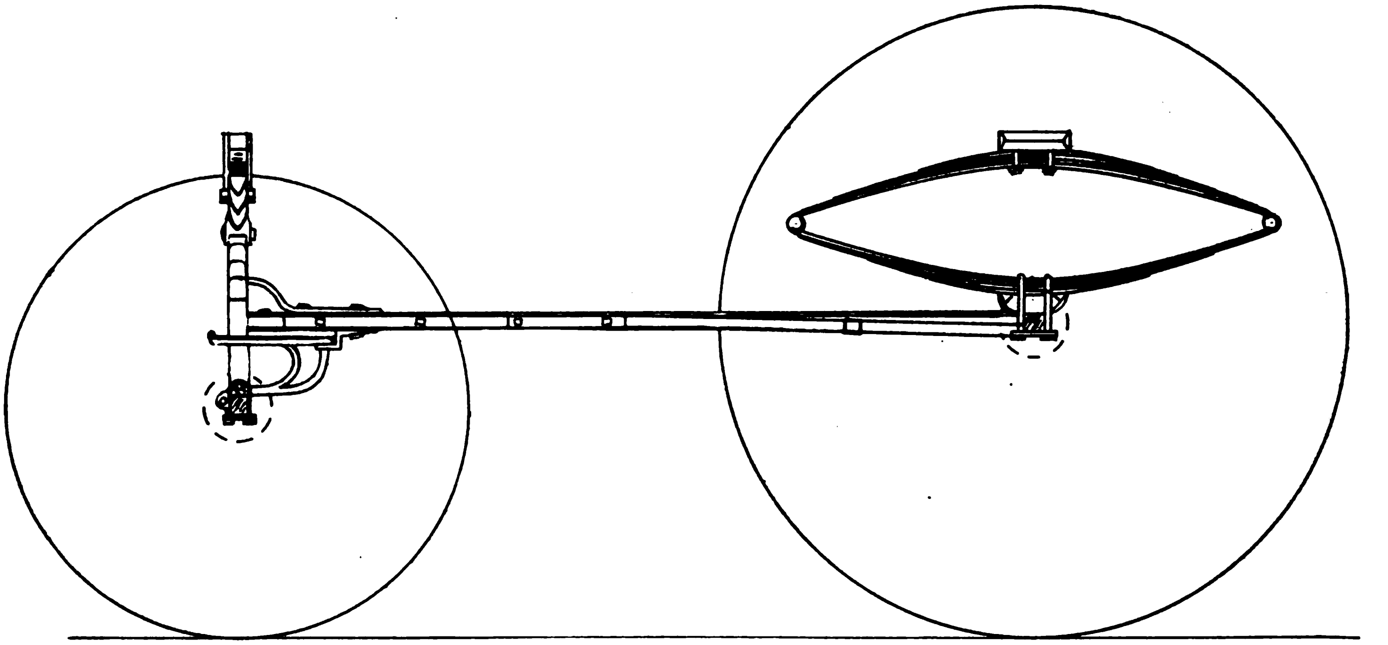


FIG. 9—SHOWING A SIDE ELEVATION OF THE RUNNING GEAR

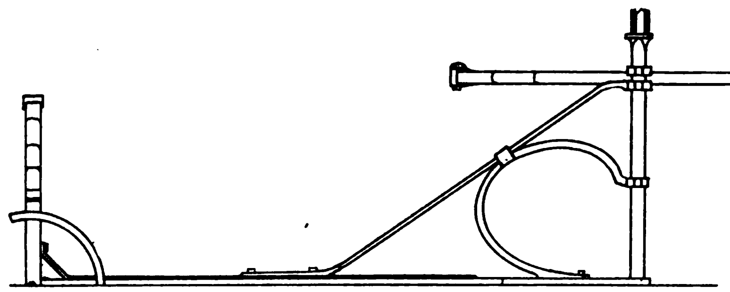


FIG. 10—SHOWING HALF TOP VIEW OF WAGON GEAR

so heavy as to be out of proportion to the rest of the vehicle.

The half-front elevation, Fig. 11, shows how the spring is secured to the head-block. This method has the advantage of being easier to make and repair than a regular clip. The half-back elevation, Fig. 12, illustrates how the springs are attached to the rear axle and also how they are fastened to the body.

The body is hung 37 or 38 inches at the back, and ⅝ of an inch higher in the front. The wheels are sarven, 2 feet 10 inches and 3 feet 10 inches high, 1¼-inch spokes, 1¼ x ¼-inch round edge steel tire; the axles are 1⅛-inch half patent. The springs are 1½ x 35 x 6½-inch. There are five plates in the rear springs and six in the front one.

The completed vehicle shown on page 55 will give some idea as to the painting and lettering, though the designs and colors which can be used are almost endless in variety.

It is not within the province of this article to describe the various processes of painting. It is sufficient to say that a quiet and good looking combination of colors is to have the top rail a dark red; the next two panels Quaker green; the one with the address on the same as the top, dark red; the body proper, green; the mouldings black, and the lettering yellow (imitation gold), and the striping the same color. The gear should be a lighter red than the top and is striped $\frac{3}{16}$-inch black, with a fine yellow line on each side of the black.

Tire Setting Explained

EUGENE MIDDLEBROOKS

Have just read with interest the article written by Brother W. K. Huff, stating that he would post $100 against an equal amount and set tires the old way against any smith setting with his cold tire setter of any make, results to be judged by six disinterested men to determine which tires will stay tight longest and which wheels are in the best shape or condition. He also states that no one has yet told him how they could make the tire smaller than the wheel by shrinking it while on the wheel. Again, he says, when shrinking the tires cold you shrink the tire and felloe all together and that the tire never gets any tighter.

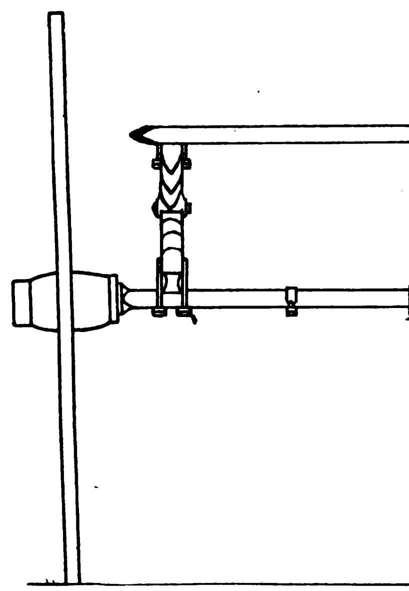


FIG. 12—HALF REAR END VIEW OF WAGON GEAR

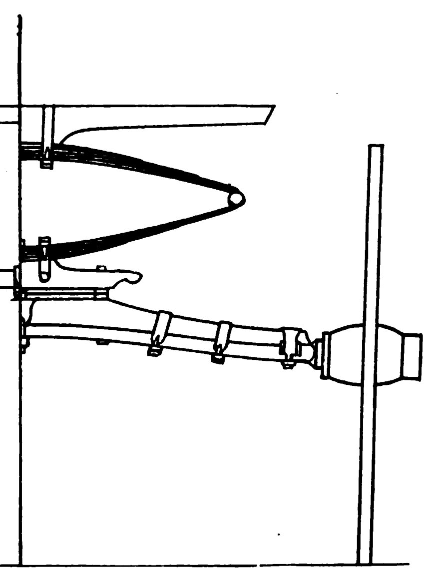
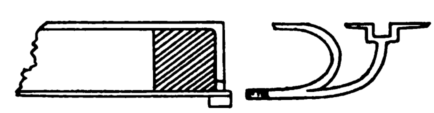


FIG. 11—HALF FRONT END VIEW OF WAGON GEAR

I will say to begin with that I will not take Brother Huff's hundred dollars, because I do not wish to get money this way. It would be like taking the last stick of candy from the baby. I can say that Brother Huff knows very little about cold tire setting or else he could not make such unreasonable statements. I guess the reason no one has attempted to answer his question as to how to make the tire smaller than the wheel while the tire is on the wheel is because they could not help but laugh at the very idea. Any man that uses an up-to-date tire setter can't say this is impossible. It is simple enough, Brother Huff.

I will take a buggy wheel or wagon wheel, take off the tire, wedge all the spokes, saw out the rim and place the tire back on the wheel cold, which can easily be done with the hands, put this wheel into my Mayers Cold Tire Setter and shrink it just as much as I like and give the wheel any desired dish. I will then take the tire off again (by using a hammer) and measure my wheel. Then measure the tire. You will find the tire from ⅛ to ⅜ of an inch smaller than the wheel. Can't you understand that, as the tire is being drawn together, the wheel will keep giving away or dishing?

If you take a thin hickory board, say eighteen inches long, one half inch thick and two inches wide, measure the board standing up without any pressure on it, it will measure eighteen inches from top to bottom. Now put some pressure against it, making it give in the center, and you can keep pressing it until you make both ends touch the floor if you like. Now turn this board loose and you will find that it will go straight again. This is exactly on the same principle as setting the tire cold. The more you shrink the tire, the more the wheel gives way under the pressure. If the wheel is any good, every one knows that when you knock the tire



FIGS. 13 AND 14—SHOWING DETAILS

off of the tight wheel, the wheel will spring back to its natural position. And every one knows that the tire will not change in the least. It is smaller, of course, and will forever

stay smaller, the same as if shrunk by the old shrinker.

Now, some people say that if you shrink a tire cold it will go back, but this is too unreasonable. I will not attempt to say what I think of such talk.

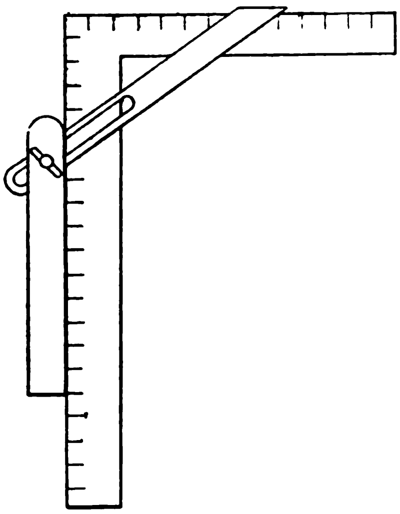


FIG. 1—POSITION OF BEVEL ON STEEL SQUARE

Now Brother Huff asks why they put tires on locomotive drive wheels with pressure? Of course, any tire that is set right has to have pressure, or in other words has to be smaller than the wheel, and the only way to get this locomotive tire on the wheel would be to heat it, but remember they do not claim to have a tire setter that will shrink a solid iron or steel wheel. There will never be a manufacturing company that will get up such a machine, for to cause an iron or steel wheel to give way under pressure would mean to destroy or ruin it. I am sure that all my brother craftsmen will agree that shrinking buggy and wagon wheels does not in any way have any thing to do with an iron locomotive wheel. If buggy and wagon wheels were made of solid iron, then we would need no cold tire setters, but there is quite a difference between the two wheels.

I would advise Brother Huff to "call off" that $100 and keep his hard earned money in his pockets, for any six disinterested men will surely hand it over to the other fellow. I have been at the business twelve years shrinking tires both ways, hot and cold, and I know that I can shrink a tire cold that will stay tight as long as any one that is shrunk the old way. I would not be without a cold tire setter for four times the cost price of the machine.

How to Cut the Joints of Carriage Seats

F. W. P.

I submit the following rule for finding the necessary bevel for making joints at the corners of splayed carriage seats. First get out the sills and frame them together. An explanation of this I deem unnecessary as any ordinary wagon or carriage maker understands how this is done. But if he does not he can readily grasp the idea by looking at any ordinary buggy seat. To get the splay or flare for the back and end panels, take an ordinary steel square and a bevel square and set the handle of the bevel square on the blade of the steel square and adjust the tongue to run from five on the blade to seven on the tongue of the square, as shown in Fig. 1. While the splay of seats varies with the different manufacturers, this will be about an average and will give a good, comfortable seat. However, if replacing an old seat, it is well to get the splay from the original, as the irons will then be sure to fit. Having your bevel set for the proper splay, the next thing to do is to find the required bevels for the corner joints. To do this proceed as follows: Take a piece of ¾-inch lumber and get it about the width you want for the back panel and join the edges perfectly straight and square. Now place your bevel on the end of the

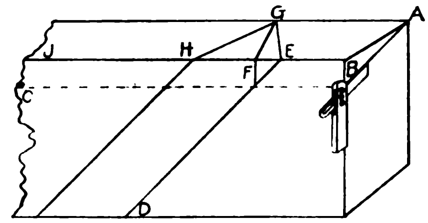
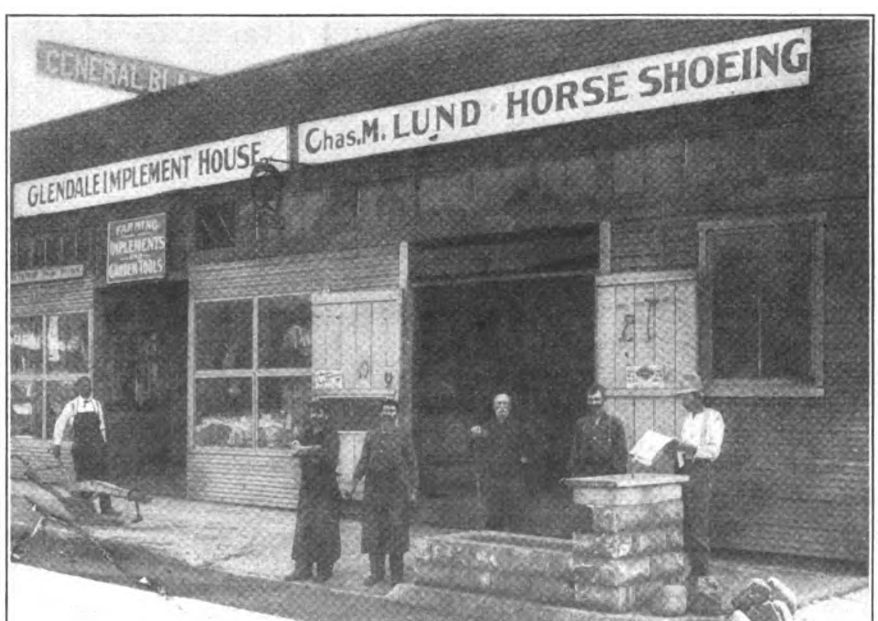


FIG. 2—HOW TO MARK THE STOCK FOR A SPLAYED SEAT

board and with a scratch awl draw the line AB, Fig. 2. Now set a marking gauge to this at B and draw line BC along the inside top edge of the panel. This being done, place the handle of the bevel on the bottom of the board and draw the line DE. Now with a try square placed on the top edge of the board square down to where BC intersects DE and draw line F, then square across the top edge of the board to G. After you have this done, measure the distance from AB and set this off on the top corner of the board from E to H, then the line from H to G will be the required bevel to give a perfect-fitting corner joint, regardless of the amount of splay on the flare of the seat. The above is applicable only to mitred corners, but if you wish a butt joint such as is commonly used on spring seats proceed as above except that instead of setting off EH and making line HG, simply draw a line from G back to E. This line will be the cut for a butt joint, the inside being the longer.

Remember, this is to be all laid off while the board is square, but



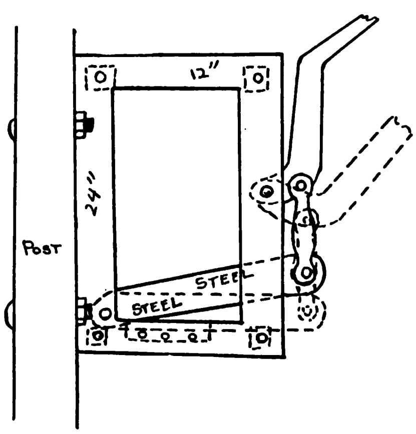
A GENERAL SMITHY AND IMPLEMENT AGENCY, RUN BY MR. C. M. LUND, OF CALIFORNIA

after having cut the joints draw down the ends and leave as much arch in the back as you wish. Also trim off the extra wood from BC to IJ. This will leave the top of the panels level when given the splay. Do not bevel the bottom of the panels, but leave them square and cut the two ends and back off the bottom frame at the same bevel you have been using. This will leave less wood for the screws to go through and will not leave so much of the sills exposed as would be the case if they were square and the panels beveled.

Two Handy, Shop-Made Tools

MACK C. HARNED

The accompanying engravings show a shear and also a punch which I designed and made myself. The frame of the shear is made in two parts, each being a duplicate of the other, the parts being bolted together with the lever and shearing knife hung or hinged between them. The cutting shear works tightly between the two frames and close up to the steel plate which is inserted



AN EASILY MADE SHEAR FOR THE SMITH SHOP

and bolted to one of the frames. This method of fitting the cutting shear eliminates all side spring and prevents the cutting edges from giving way. The half frame opposite the one in which the cutter is fastened should either drop below the other or have a niche cut out of it so as to allow for the clearing of the iron which is being cut. In my shear I am able to cut ¼ by 4-inch flat iron and up to ¾-inch round stock.

The frames are made of ⅝ by 3-inch stock, and the corners welded by means of inserting a piece of square stock. No doubt you will find it a difficult job to weld this frame up in nice shape, but by cutting a V out of the iron at the corners before welding you can do it very easily and nicely. The method of hanging the lever and the connecting toggle is very clearly shown in the engraving.

It will be noted that the power in the punch is exerted by means of an eccentric on the end of the lever shaft. This operates on the end of a steel shaft, the bottom of which is provided with a shuck to hold ½-inch round shank punches. The shaft is turned and works in two close fitting eyes made from flat stock and riveted into the frame with two rivets to keep them rigged so that they never bind the shaft and hinder the operation of the spring which serves to lift the punch. The frame of the punch is also made in duplicate.

The anvil is of steel and dovetailed into the frame. It is provided with two holes $\frac{3}{16}$ inch and ¼ inch in size, which are the only sizes I have tried so far with this punch. This is a very handy tool for punching all thin band iron which goes into the making of a wagon, and especially plates which are to be nailed on. I cut plates of this kind, shape on the shear and punch them on this little tool and I find I am able to do work very quickly in this manner.

I have other shop-made tools and machines which I will explain at some future time. All the wood working machines I have are of my own design and manufacture.

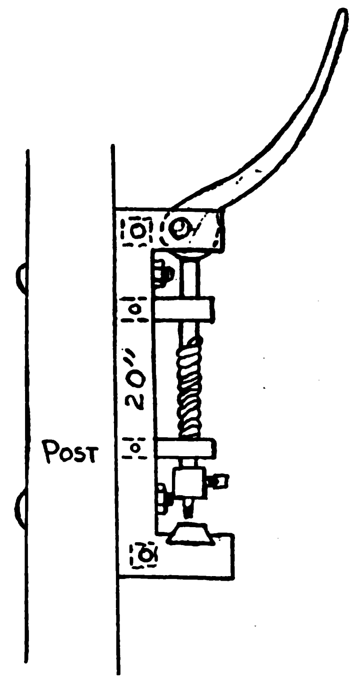
Some Practical Hints on Welding, Brazing and Tire Setting

THOS. MARKS

I would like to see those fast horseshoers. They must put on shoes with a repeating shotgun, for to my way of thinking it is impossible to put on a shoe in five minutes and nine seconds, if they dress the foot properly and put the shoe on right.

I believe Brother Frazell's trouble is poor coal, or else he is trying to burn ashes to save coal. He gets his steel too hot and used too much borax or compound.

If you are trying to weld a buggy stub give it a good juicy heat and just before it sparks take it out and get the pieces placed firmly on the anvil so that they won't jump apart and strike a good firm blow, (not straight down, but turning the hammer so that the face will be about the same slant as the scarf) but don't strike too fast. Stick the two ends down and finishing will be easy. If you cannot stick both ends at the first heat one will hold it. I work

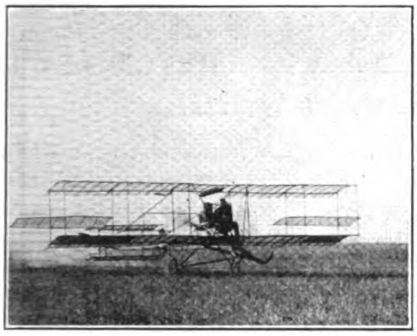


A HANDY PUNCH FOR THE VEHICLE SMITH

alone and can stub a rig up to 1⅛ inches in one half day, including setting boxings, and can have the rig ready for service in that time. As I charge fifty cents a stub, twenty-five cents a box, fifty cents for taking the axles off and placing them on again, I make $3.50 on the job. And if I furnish the stubs I charge from $2.25 to $3.25 for the stubs and, as I buy them for $1.50 and up, I make a small profit from them.

I do brazing, but I do not use a torch brazer in the forge. I can braze most anything, except one kind of cast iron which is too difficult for me, though I don't know why. I use wire, one size about No. 12 and one No. 9, sometimes one and sometimes the other. If I want lots of brass I use the No. 9, and for a light job No. 12. I take the broken pieces, cut into them with a hack saw, so that the gashes will match, slip a piece of hoop iron into the gashes so that the ends of the broken parts will come down together nicely and then with a light hammer bend the ends of the hoop iron down so it will hold the casting right. Heat it to a good cherry heat, rub on a little borax, let it melt, apply one end of the wire and

when I think enough of the brass has melted I take it out. Use a hammer and press the two pieces tightly together until the brass sets. Now cool and file the rough places and it is finished. Sometimes I have to use cyanide of potassium, about one ounce to a pound of borax. This will do a good job.



MR. BOWERS AND HIS MACHINE

Regarding cold tire setters, I have used three different makes in the last five years and find them a success. I can show tires which I set on a House machine in August, 1909, which are still tight. I purchased a new Mayer tire setter in April, 1910, and can show tires, set with this when I first used it, still tight. I would advise Brother Huff not to get a cold tire setter if he doesn't intend to do some of the work himself, for the machine will not do it alone. A man is radically wrong who believes a tire is smaller when on the wheel than the wheel itself. As a rule the man who is the hardest to convince, is the cold tire setter's best friend afterwards. There are many smiths who would be able to take that hundred dollar bluff, for I believe it to be such. I know that I can set a wheel better cold than hot and while I don't say it will stay longer, still I am positive it will last as long.

Blacksmith and Aviator

The accompanying engravings show Mr. Reuben Bowers of Washington State seated in his aeroplane. The machine is a headless type biplane and has made eight successful flights. Experts say the machine is one of the finest examples of aeroplane work ever turned out.

Every piece in the machine with the exception of the power plant and the two landing wheels is hand-made. All the wood work is finished in spar varnish, while the metal part is finished in aluminum paint.

The width of the machine is 36 feet, length 27 feet and it weighs 800 pounds. The engine is a four-cylinder, 40-60 horsepower, 2-cycle type, weighs 178 pounds and has a speed of 50 miles an hour.

This we believe is the first and only aeroplane to be built and successfully flown by a blacksmith. Mr. Bowers is a machine smith.

MR. REUBEN BOWERS, OF WASHINGTON STATE—BLACKSMITH AND AVIATOR

How We Weld Axles

John McConnell

According to my ideas and from the experience I have had the past few years at the trade, having done a considerable amount of axle welding, the following is a very good method:

First measure the stubs so as to have the axle the same length when finished. Then heat the axle and stub. Cut off the axle and scarf down the end a short ways. Scarf down the stub as nearly the same as possible. Then take a heat in a clean fire, but do not have the heat heavier than is needed. We use the Climax Welding Compound. Two men can weld axles up to 1¼ inches with one heat and finish them up nicely. I find that our way of welding axles is much easier than the way employed by Mr. McGill. Cutting them the way he does may keep them from slipping, but it also gives the scales a chance to fill in the opening and when you have a heat you cannot get them all out by welding the axle in that way, as there will be a little space that is not welded perfectly.

I am employed at the wagon works here and we do a lot of different kinds of heavy welding and we never cut anything to keep it from slipping, and we have no trouble. Many of my brother readers may do as we do, but if those who do not will try our plan we think they will find it makes a good job.

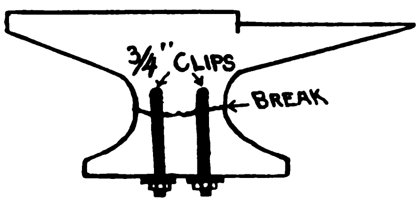
Axle Welding, Fast Shoeing and Tire Setting

J. B. Gelwick

In the September number I read Brother R. A. McGill's article on "How to Weld Axles", and must say his method is O. K., as far as I know. However, instead of cutting a gash across both pieces I prefer only one. I then heat the other end and after cooling the one in which you have cut the gash place it on top of the one that is hot and deliver a few heavy blows to make an impression in the hot one, thereby forming the lock. But, when Brother McGill says a compound is no good, I beg to differ, for if he had to use coal such as we do in this part of the country I venture the assertion that he would not weld many axles without some sort of flux. I am using now the Climax compound and have welded a great many axles in the last eight years and have been obliged to reweld but one axle in all that time. The coal of this section contains lots of sulphur and slate and while it will blaze continuously from morning to night, yet it lacks life, and regardless of how much water used it will not last.

Consequently, many a time, right at a critical point you will be compelled to break down some more or less green coal to complete the heat and then with the excess blaze and heat therefrom you are up against a hard proposition. I have welded binder, mower, drill and plow seat springs with Climax compound and poor coal, and am therefore competent to say that it is a success. I have never yet failed to make a spring stand up, except on a spring wagon occasionally when it was overloaded.

Now in regard to that fast shoeing. I won't go so far as to say it cannot be done, but will say I am considered a pretty good horseshoer and, while it is all well and good to be fast, I prefer to do the job as well as I can first, and as quickly as possible secondly.



HOW THE ANVIL WAS REPAIRED

In dressing the feet I take the shoes from the keg, calk and fit the same and, completing the job on one horse, I find by my slow methods I have absorbed approximately an hour's time and working all the time at that.

I like to read the discussions upon the merits and demerits of the cold tire shrinker and must say that I think there have been some good arguments presented on both sides. Now I don't know as to the old method, but I think if proper care is exercised by an intelligent smith, good results may be obtained by the cold process. I have set tires on old wheels that were in pretty bad shape, and succeeded in making a good job that I am afraid would have bothered a cold tire shrinker man considerably.

How I Repaired My Anvil

L. O. Pledger

Here's a description of the method I employed in repairing my anvil which broke off at the waist the other day.

I drilled two ¾-inch holes through the top half and made two ¾-inch clips twenty inches long. I next bent one corner down, and after heating them put them through the holes and bent down the other side. Next I put on two clip bars and screwed up the nuts which completed the job. The anvil is now as steady and solid as ever.

I enjoy reading Our Journal very much and I have all the numbers of Volume Ten which I intend to bind in book form. The index in the last number makes a very complete book for which Our Editor should be congratulated.

I am especially interested in automobile repairing and would like to see more of it, especially carburetor adjustments, magneto and its coils and wiring.

MR. JEWETT'S SMITH SHOP AND GARAGE IN NEBRASKA

Several Matters to Think About

G. B. Jewett

Reading about a brother smith in Dakota sharpening seventy-seven lister lays in a day, I have been looking for Brother Metcalf's decision as well as that of others on the same. Don't be discouraged if you cannot do the same amount of work in a day. But perhaps Brother Metcalf has done what I have just done, that is, taken a vacation and visited a few shops. I have found out that there are a great many better workmen than myself and a few who are not as good. The only consolation is that you have found some who are not up to your standard, but cheer up, it is an inspiration for you to endeavor to become a better craftsman.

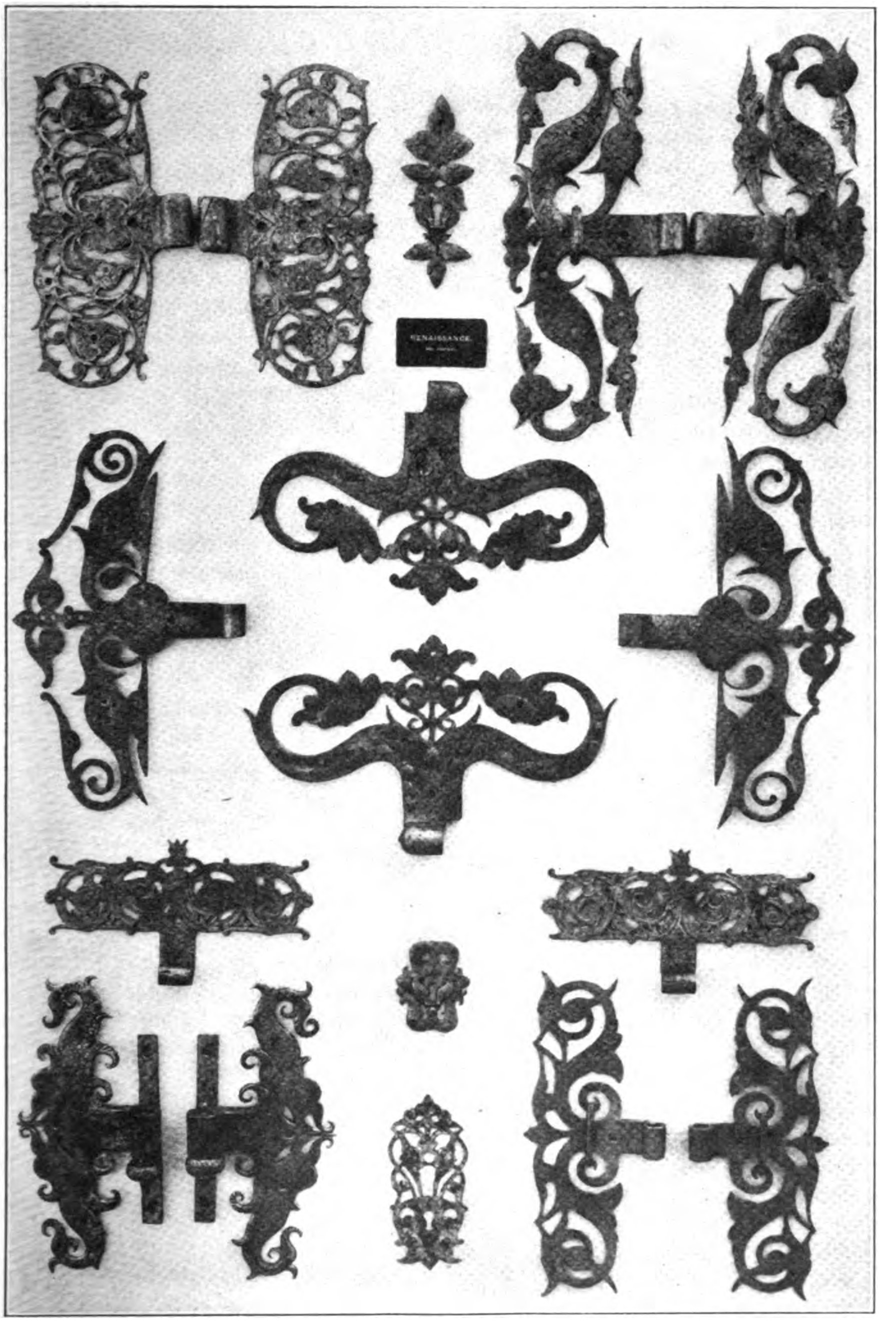
I am sending a photograph of my shop which consists of four rooms each 24 by 80, two for blacksmithing and woodwork, one for plumbing and pumps and one is used as a garage.

I have come to the conclusion that the passing of the smithy is no joke even in this country, and that the young man that puts in three years learning the trade has wasted his time. It has been quite amusing to me to read Brother Stites' article from New Jersey on the smithy being of most importance now. In my estimation he is of the least importance in the community and when a man wants a cheap, dirty job he generally hunts up the smith; and when he has a fine piece of work on hand he goes to the machinist or some high-priced man.

Now, Brother Stites, you don't see any blacksmiths sitting at the

AN OHIO SHOP, RUN BY FOUR GENERATIONS OF BLACKSMITHS—NOW OPERATED BY MR. W. H. TUTTLE

right hand of royalty or at the right hand of President Taft on his trip West. Nor did he sit at the right hand of King Solomon for trimming his horse's feet and repairing his buggy for years for nothing. The brick layer with a kit of tools worth about $20.00 can earn from $5.00 to $7.00 per day of eight hours; the important smithy with a thousand dollars invested in tools will make the bricklayer's trowel at the rate of $2.00 per day. At the same rate he makes the dentist's forceps, who in return receives from fifty cents to a dollar for about three minutes' work extracting a tooth; or the surgeon's instruments, who charges a minimum of $100.00 for thirty minutes' work. That is the reason the smith is absent from the feast; he has been working so hard and long for practically nothing that he hasn't the money to enjoy life. The other mechanics look on the smith with disgust, simply because he hasn't initiative to charge a proper price for his work. If he would charge the other mechanics a proper price for the tools which he makes for them he would then be in a position to enjoy more of the good things of life. The one thing the blacksmith must learn is to secure a fair price for his work. Don't be a "Cheap John." This is one of the reasons why there are no apprentices learning the trade. A little boy of five the other day asked,—"Do you get twenty-five cents for every nail you drive in the horseshoe? If you do," he said, "I believe I would like to be a blacksmith." Even the children are taking notice, and when you see an old blacksmith who has been at the trade thirty, forty, and fifty years, and still working in a little old shack of a building and compelled to work every day, without some of the necessities of life, to say nothing of the luxuries, the young man looks around for some trade in which he can make more money.



SOME SIXTEENTH CENTURY HINGES AND ESCUTCHEONS—IRON WORK THAT MANY MODERN-DAY SMITHS WILL FIND DIFFICULT TO DUPLICATE

The Kansas State Convention

The Big Meeting Scheduled for January

The Fifth Annual Convention of the Blacksmiths, Horseshoers and Wagon Makers of Kansas will be held at Lyons, January 3rd and 4th, 1912. Every craftsman of the Sunflower State is earnestly invited to attend this monster meeting, and it is hoped that every smith in the State will co-operate to make this Fifth Convention the biggest and best that has yet been held.

A large exhibit and blacksmiths' fair has been planned, and already all of the important business houses have reserved floor space. There are a number of novel features planned, among which is a visit to the Bevis Rock Salt Mine and a trip 1,100 feet under ground. Beside the social and entertainment features there will be practical lectures and demonstrations on mechanical matters that will send each man home, a better smith and a larger man in every way.

Plan to attend this convention—you'll find yourself well repaid both for time and money spent. And even if you are not a Kansan don't let that keep you at home. Every smithing craftsman will be welcome. Don't forget the date—January 3rd and 4th, 1912, at Lyons, Kansas. Write to Ed. Bohrer, at Lyons, Kansas, if you want to reserve hotel accommodations.

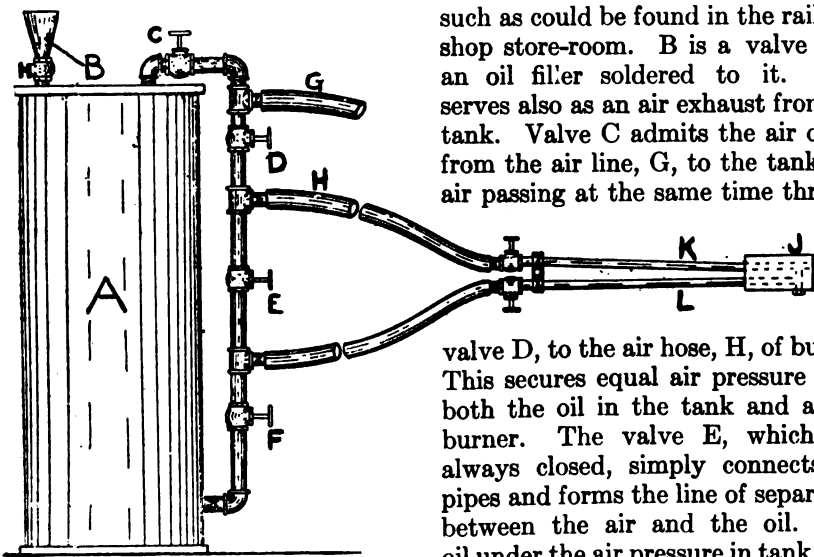


FIG. 1—OIL BURNER AND TANK SHOWING PIPE ARRANGEMENT

Attend this big meeting, meet your fellow-craftsmen and help to put the craft on a higher, broader and more co-operative basis. Never mind the other fellow—you do your part.

Calendars for Advertising the Smith Shop

The sign over your door tells people your name and the kind of work you do. But that sign speaks only to persons who pass your door. It cannot talk to the man who never passes your door, but whom you want as a customer, nevertheless. It cannot speak to the man you want as a customer just when he has need of your services. To get your sign before the man when he needs a smith—when the presence of your sign will bring him to your shop—you must hold your sign before him where the need of your services originates; and that is in the office, the store and the home. Send your sign out after the business, and the business will come quicker and stay longer than if you wait for the business to seek the sign.

"The perplexity of John Smith"—our calendar for 1912—is a worth-having calendar that is worth keeping. It will carry your sign into THE right places and keep it there. Fifty or one hundred of these calendars will cost you very little—none at all will cost you more. Better order NOW than never.

How to Make an Oil Burner for Brazing

W. B. R.

The 26-gallon tank, A, Fig. 1, is an old locomotive air cylinder; the pipe fittings and attachments are such as could be found in the railroad shop store-room. B is a valve with an oil filler soldered to it. This serves also as an air exhaust from the tank. Valve C admits the air direct from the air line, G, to the tank, the air passing at the same time through valve D, to the air hose, H, of burner. This secures equal air pressure upon both the oil in the tank and at the burner. The valve E, which is a always closed, simply connects the pipes and forms the line of separation between the air and the oil. The oil under the air pressure in tank flows from the bottom of the tank upwards through valve F, to the oil hose, I, connecting with the burner. The relative position of the tank and burner arrangements as shown in the drawings should make these points clear.

The burner, J, is a piece of 2¼ or 2½-inch round brass into which 5/32-inch holes are drilled. The air hole, K, passes straight through the metal; the oil hole, L, about three fourths through, and is then diverted at right angles into the air passage by another hole drilled vertically from the surface. A small set screw plugs the end of this hole, which is useful in allowing the burner to be cleaned when necessary.

Five or six feet of ⅜-inch pipe attached to the brass cylinder, with valves to regulate the air and oil as shown, complete the burner. This apparatus is not very well adapted for brazing, as the crude oil used as fuel contains too much carbon for this purpose.

An oil burner of lighter proportions suitable for brazing purposes is shown in Fig. 2. The part A is a piece of 2-inch copper pipe 8 inches long. The lower end of this pipe is flanged as shown at C, having a number of ¼-inch holes drilled around the flanged part to admit air into the pipe for combustion. The larger central hole fits over the small cap B, the parts being held together by the fork D, which is 7/16-inch round iron flattened at the ends, riveted to the copper pipe and clamped at lower end to the air and oil pipes, as shown at E. The construction and purpose of the part F, Fig. 2, is shown in section on a larger scale in Fig. 3.

F is a small, solid double "T" piece of metal into which a ⅛-inch hole and a 1/16-inch air hole are drilled as shown. The air hole is drilled in the form of a T, the lower arm being plugged by a set screw, making it easy to clean the air passage when obstructed. The air and oil converging into the small chamber A, of the cap B, Fig. 3, pass together through the ⅛-inch aperture C, of the cap into the larger copper pipe of burner. The cap B, is a small, round piece of brass about 1⅛ by 1½ inches long, drilled as shown in Fig. 4 and screwed onto the piece F.

The oil tank used with this burner need not be of more than four or five gallons' capacity, having but one hose connection for the oil, which flows by gravity, the tank being elevated ten feet or more for this purpose. The air is taken directly from the air line to the hose of the burner. Kerosene oil is used as

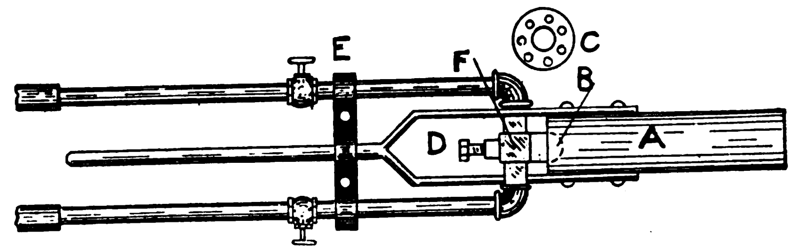


FIG. 2—THE OIL BURNER FOR BRAZING AND THE PIPING ARRANGEMENT

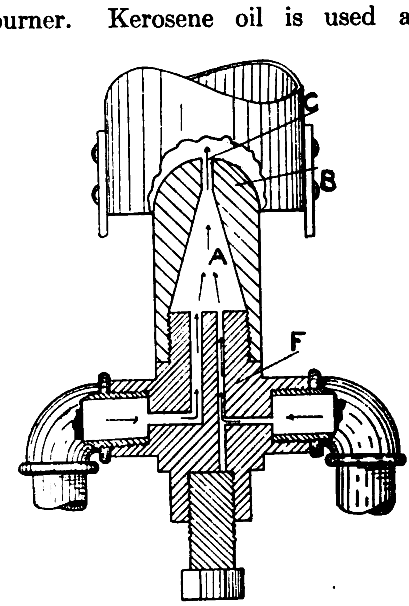
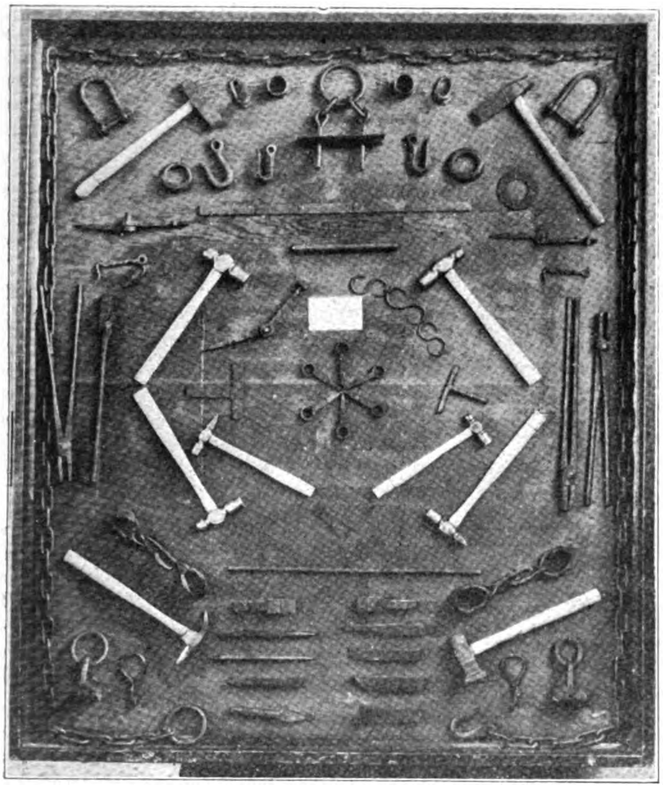


FIG. 3—SECTIONAL VIEW OF THE T-PIECE OF BRAZING BURNER



SOME OF THE WORK DONE BY STUDENTS OF OREGON AGRICULTURAL COLLEGE

fuel. This burner is used daily in our shops for brazing, removing old babbitt from brasses and for general straightening purposes.

In assembling either one of these burners care should be taken so as not to reverse the courses of the air and oil. The air should pass through the straight passage and the oil through the crooked hole of burner. Some practice is generally necessary to handle these appliances perfectly, but when this is attained they will invariably be found invaluable.

Horses and Horse Sickness in South Africa

W. J. Meares
(Farrier, South African Police)

Horses are scarce at the present time in this part of the world, and our veterinary has great difficulty in getting suitable horses for police work. Our horses have to be fourteen hands two inches high and they cannot be bought at present under thirty pounds ($146.00) each. There is a disease among the horses here every summer called "Horse Sickness." The symptoms appear over night and the horses die before anything can be done to save them. This disease so discourages breeders that we have very few horse breeders. Of course, in some of the higher districts the disease is not so bad, but when the horse is purchased for use in some low-lying district there is the risk of its dying, and on this account each member of the corps has to pay 3s ($ .73) per month into the "Remount Fund." This is really an insurance fund. If a member's horse dies he is provided with another which is paid for out of this fund. The first horse the trooper, of course, has to buy himself. The system which has been used at headquarters to prevent this dread disease is to stable the horses about five o'clock in the evening and light smoke boxes which consist of a galvanized iron drum like a plumber's heating arrangement with a hood and pipe to carry the smoke into the stable. This is kept going all night by the sentry, the boxes being filled lightly with straw and damp litter. It is supposed that mosquitoes are the cause of the disease, and the object of the smoke is to keep the stables free from them.

Benton was sitting in his chair puffing at his favorite pipe when the Editor surprised him with: "Say, Benton, do you think we've reached the limit of handicraftsmanship? Has specialization made a man work as a machine to such an extent as to make further advancement impossible?"

"That's a peculiar question to ask," returned Benton. "What put your mind in that channel of thinking?"

"Well, Benton, scientists long ago discovered that there were pitches of sound that we cannot hear, just as there are colors that we cannot see. There is a limit to our power of vision and of hearing. Now, the question is, is there a limit to handicraftsmanship? Has that limit been reached or is it by any possibility declining?

"True, not a month passes that does not add some wonder to the list of things manufactured, but we cannot infer from this that man as a master of handicraft is becoming more adept every year.

"Let us, for instance, look into a big manufacturing plant. We look with awe upon the machines, we marvel at the skill that has planned the modern mechanisms. We stop to watch the men at the gigantic drill presses. They work with such precision and regularity as to almost seem a part of the machine they control. They run these same machines day after day, month after month and year after year, yet how many of these men can sharpen the drills they place in the spindles of their machines?

"We stop 'midst line upon line of lathes. We see men caring for one, two, three, yes and sometimes four, machines. Modern cost systems demand modern manufacturing methods. You see the men going from one machine to another—taking out finished work, setting up new, changing the speed here and the cut there and instant dismissal staring him in the face whose machine is idle or he who forgets to stop the machine when one piece of work is finished. Yet how many of these men at the 'automatics' can forge the tools they use or even make a cold chisel? Place them anywhere else in the plant and they are as much 'at sea' as a fish out of water.

"They do things differently in Switzerland. Over there workmen learn their trade thoroughly. A man is not a lathe man or a drill-press man. And this very fact was not more vividly illustrated than recently.

"Swiss music-boxes were, up to several years ago, known the world over, and an immense industry was the manufacturing and selling of these ingeniously-made machines. Then came the American talking-machine and American methods of selling it. Swiss music-boxes—have you heard about them since the advent of the graphophone, the phonograph and similar machines? A great industry in Switzerland received its death blow, but you didn't hear a great army of working men starving. They went right into the famous Swiss watch factories and other industries requiring skilled workers. These same men who had been making music-boxes made watches and fine instruments.

"Would such a thing be possible in the United States today? If something should happen which would throw the machinist, the lathe man, the man at the drill press out of his regular employment, how many of them do you suppose would be able to do good work in other lines—say in the smithshop, for instance?

"Would such a possibility threaten the smith—the general worker? He uses his hands in many ways. His work is real handicraftsmanship. He does not depend upon the machine to do his work. He must form and shape his masses of metal with forge, hammer and brain.

"Not a month passes that does not add some wonders to the list of things manufactured. We look with awe upon modern machines; we marvel at the skill which has built modern mechanisms.

"Are these wonders of modern scientific and engineering discovery made possible by this very specialization? Has the attention to special and single lines been the very cause of this wonder-work? Do you know the answer, Benton?"

On Beaver Crick

W. O. B.

T'other day a friend o' ours sent us a mess o' fresh-caught perch. T' our way o' thinkin' thar's pesky little thet 'll beat 'em fur taste when thar fried rite. The smell o' them in the hot pan bro't a nibble on the hook o' mem'ry an' this is what we caught:

I han't got knack o' lang-a-wedge,
No words o' mine hes got the edge
Ter pitcher things up t' the skies
An' make folks see without thur eyes.
But if I could jes' write a bit,
Y' bet'cher boots I'd make a hit,
Describin' days on Beaver Crick—
The days gone by when fish was thick.

By crackee! Wish I could recall
Them fishin' days—go thro' it all—
The packin' o' the lunch an' pans
The tromp t' where the boathouse stan's;
The fittin' out with pole an' bait,
An' rowin' t' where the fish await.
Then lookin' fur the fishin' hole,
An' sittin' thar with line an' pole.

'Most makes me feel jes' like a boy
T' think o' them ol' days o' joy,
When dad an' me an' Brother Hank
Would land the boat an' climb the bank
O' Beaver Crick. An' round 'bout one
We'd skin our fish—soon hev' 'em done
Es crisp an' brown es yew could wish—
Fit fer the gods wuz them thar fish.

God could hev' made a better fish,
But He never did. An' on my dish
Wuz never laid a better bite
Than fresh-caught perch thet's been fried
rite.
By crackee! Wish I could recall
Them fishin' days—re-live 'em all—
Them good ol' times on Beaver Crick,
Them days gone by when fish was thick.

A MERRY CHRISTMAS
To All Our Folks
May perfect health and happiness be your biggest portion, with enough of wealth to sweeten life.

Don't forget—write it 1912 after the 31st.

Don't judge people by their own opinions—of themselves.

Brain-food to do its work must have something to work on.

Discontent is the blast of reproach that refuses to let the fire of energy die.

Of course, a smith can repair spring wagons in the fall.

The fastest time ever made by an automobile was one mile in 25.4 seconds

When a man uses up all his religion on Sundays, watch him closely the other six days.

The chief rewards of this life aren't delivered in pay envelopes, though more employers than employees believe this.

The busiest man doesn't always accomplish the most. Sometimes he just fusses about—getting in the way of other folks.

Some men are afraid they'll get all that's coming to them—others are afraid they won't.

Small ideas and big successes don't travel together. Modern machinery and tools have taken the place of moss-covered makeshifts.

Economy is a good hobby if not ridden to death. Better harness it up with Enterprise and drive the team to Prosperity.

The world grows older and competition grows sharper. It behooves the man who would be successful to grow larger accordingly.

The National Library of Paris was founded in 1229 and now contains three million volumes. It is said to be the oldest and largest library in the world.

Men have dug for gold since the beginning of the world—yet the hen is a greater producer of wealth than all the mining industries in the United States.

We've told you before, but it's not too late yet if you haven't done it. And you'll be surprised how bright and cheerful a coat of whitewash will make the shop. Better do it now while you've time.

Better be known as a "quality crank" than as a "speed marvel." It'll get you more trade to insist upon work being correct than to try to uphold a reputation for speed. Think it over, Mr. Reader.

In black and white should every transaction be. Then you'll be able to prove when a dispute arises. Keep records of all your transactions. They're valuable for comparisons and indisputable in law.

Though we hear comparatively little about the Hague Tribunal it is estimated that it has saved fifty-one and a half millions of dollars for the nations of the world during the past five years.

They tell us that there are two cows, a horse and one half, one sheep and three quarters of a hog to every man, woman and child in the United States. Have you got your share?

Every horseman knows it's harder to feed a horse that is idle than one that is being worked hard; and every housewife knows that it's harder to feed an idle man than one that works every day.

Help your neighbor well along toward a Merry Christmas by getting him to subscribe to "Our Journal." Make your greeting real by handing him a copy of The American Blacksmith.

The field thought is not ploughed by simply turning things over in your mind. Bumper crops are not raised by simply scraping the surface of the land. To raise a crop of worth-while ideas you must dig down into the fertility of the brain.

To many of us this seems like another of the Weather Bureau's jokes, but it is estimated that the forecasts of the "Weather Makers" are worth fifteen million dollars annually to the farmers and shipping interests.

There must certainly be something in which you excel your competitors. Look for that one thing carefully and when you find it, make a big noise about it—and then keep making a big noise. It'll bring things your way.

"**Why do you work** for the same prices you received ten years ago?" we asked when Tom complained about his profits. But Friend Tardy said he isn't working for the same prices. Come to find out, Tom's getting less for his work today than he did ten years ago.

Now's a good time to look about and see what changes you can make for next year. What improvements can you install? What leaks can you cut out? What changes will help you and your business? Think hard on these matters—lay careful plans and then work them and observe them as though they were the law.

Do you like to do business with a gloom-distributor? Talk prosperity and success and smile when a customer comes in. It pays in sound, hard dollars and cents. And it costs you—nothing. Be cheerful and smile; be big-hearted and square; be good-natured and friendly, and friends and business will be drawn to you as a magnet draws steel.

If each day brought you no new knowledge of the craft you would have little or no encouragement for continuing in it. It's the very fact that we learn each day—the fact that we can't learn it all that makes us want to learn more and more. If it were possible for one man to know all about any one trade—to know its every twist and turn—to know its limitations and possibilities—to know it perfectly in every detail—that man would have nothing to work for, he would have no incentive for further exertion. So let us all be thankful that our trade is one in which each day's sun sees some addition to our store of trade knowledge. One man, though he live ten times the three score and ten, cannot know all about blacksmithing—and the longer one lives the more apparent does this fact become.

The "actor-feller from Boston" had just recited "The Village Blacksmith" amid intense admiration. When he concluded, the audience in the "opray house" cheered and applauded until it was blue in the face.

"Ang-cor! Ang-cor!" cried the crowd.

The "actor-feller" was just about to go on again, when a big, burly giant tapped him roughly on the shoulder and said:

"I've jes' come 'round from in front an' I want y' t' do me a favor."

"Well, well, what is it?" queried the "actor-feller" impatiently as cries of "Ang-cor" were renewed louder than ever.

"It's this," whispered the burly giant. "I'm the feller you've been talkin' about, an' I want y' t' put in a verse this time 'bout me repairin' autos an' supplyin' gasolene."

Our Honor Roll

Still Growing

Our Honor Roll still continues to grow and each month sees a substantial increase in the number of names eligible for position in this list. If you haven't yet considered getting your name here among the elect, better do so now. This list is limited to this page, and another month or two will see the limit reached. We will then publish only enough names to fill this page. So get into the list now—and well up forward, too—that will insure your staying for some time.

Our long-time rates not only enable you to get on the Honor Roll at small cost, but these liberal rates save you considerable money on your subscription. The exact amount you save depends upon the term for which you subscribe, and it doesn't require a business expert to tell you that the biggest saving and the most advantageous rate is the ten-year term. Will you enable us to add your name to this list of paid-in-advance subscribers?

	U. S. and Mexico	Canada	Other Countries.
Two years	**$1.60**	**$2.00**	**10 shillings.**
Three years	**2.00**	**2.70**	**14 shillings.**
Four years	**2.50**	**3.20**	**18 shillings.**
Five years	**3.00**	**3.75**	**1 pound.**
Ten years	**5.00**	**7.00**	**1 pound 14s**

A paper with a list like this and with several thousands of other subscribers who have paid in advance to 1914, 1913 and 1912 must be valuable. Practical smiths don't pay for a paper in advance unless that paper is practical and worth real money. Ask your neighbor to subscribe—show him this list.

NAME	Subscription Paid to
I. J. Stites, New Jersey	Jan., 1923
R. S. Crisler, Kentucky	Jan., 1920
T. P. Considine, Massachusetts	Dec., 1918
Richard Brenner, Texas	Feb., 1918
J. M. Brown, Texas	Apr., 1917
W. L. Roark, Texas	Mar., 1917
A. Tillman, California	Feb., 1917
Walker Bros., New Zealand	Feb., 1917
A. E. Nickols, Oklahoma	Dec., 1916
C. J. Hall, Washington	Dec., 1916
W. B. Knouff, Alabama	Oct., 1916
Gorham Bros., Iowa	Oct., 1916
W. H. F. Brauch, North Carolina	Oct., 1916
Clark Olds & Co., Nebraska	Oct., 1916
Irwin Scott, New York	Oct., 1916
Jno. Goetzinger, Iowa	Sept., 1916
Geo. Fleckenstein, California	Sept., 1916
Geo. Hill, Australia	Sept., 1916
E. C. Beard, Australia	Sept., 1916
J. K. Glinicki, Michigan	Sept., 1916
Oscar Buhner, Maryland	Sept., 1916
A. J. Hammond, California	Sept., 1916
Robert Murray, California	Sept., 1916
D. E. Wright, Pennsylvania	Sept., 1916
J. S. Haskell, Colorado	Sept., 1916
R. Sommer, Australia	Sept., 1916
J. A. Sequin, Canada	Aug., 1916
James Clarke, Jr., Australia	Aug., 1916
Dispatch Found'y Ltd., N. Z.	Aug., 1916
C. P. Robertson, South Africa	Aug., 1916
A. A. Bahlke, Michigan	July, 1916
J. K. Hansen, Australia	July, 1916
J. B. Barker, Illinois	July, 1916
H. M. Larsen, Wisconsin	July, 1916
Geo. P. MacIntyre, Maine	July, 1916
G. R. Harrison, Australia	June, 1916
J. Waycich, South Africa	June, 1916
W. Voight, South Africa	June, 1916
Martin Jensen, Wisconsin	June, 1916
Chester Humbert, Wisconsin	June, 1916
Lincoln Underhill, California	June, 1916
M. Broton, North Dakota	June, 1916
Hans Eriksen, Illinois	June, 1916
C. Morrell, New Brunswck	June, 1916
J. O. Conrad, Kansas	June, 1916
Adam Schmitt, Michigan	June, 1916
James Sinclair, West Australia	May, 1916
H. Baker, Australia	May, 1916
E. Q. Krehbiel, Kansas	May, 1916
C. H. Cairns, New York	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vermont	May, 1916
C. A. Stebbins, Kansas	May, 1916
Sanford Baker, Missouri	May, 1916
P. A. Peterson, Iowa	April, 1916
D. E. McDonald, Florida	April, 1916
James Baxter, South Africa	April, 1916
E. P. Dignan, South Australia	April, 1916
W. H. Winget, Vermont	April, 1916
A. Rockenschup & Son, Louisiana	Mar., 1916
C. H. Alexander, New York	Mar., 1916
A. M. Harebo, Wisconsin	Mar., 1916
George Howard, Kansas	Mar., 1916
G. N. Follmar, Nebraska	Mar., 1916
W. Willoughby, Michigan	Mar., 1916
H. Hoffmeyer, New Jersey	Mar., 1916
Frank L. Locke, New York	Mar., 1916
Frank L. Evarts, Connecticut	Mar., 1916
C. R. Winget, Vermont	Mar., 1916
Hugh & John Chisholm, N. Z.	Mar., 1916
C. F. Molkenten, Australia	Mar., 1916
H. D. Phillips, South Australia	Mar., 1916
F. J. Flessel, New York	Feb., 1916
E. P. Jones, Kansas	Feb., 1916
C. K. Cornelison, Pennsylvania	Feb., 1916
M. Klitgord, New York	Jan., 1916
O. Stenning, South Dakota	Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts	Jan., 1916
Feldmeyer & Schaake, Kansas	Jan., 1916
Geo. Sykes, Australia	Dec., 1915
W. Patrick, New York	Dec., 1915
Jas. A. Sharp, Massachusetts	Dec., 1915
J. Krahulec, Illinois	Dec., 1915
P. E. Dahlfurst, California	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Nebraska	Dec., 1915
G. S. Fisher, Nebraska	Dec., 1915
Printers Supply Company, Nebraska	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Virginia	Dec., 1915
C. J. Ash, Kansas	Dec., 1915
F. H. Joslin, Massachusetts	Dec., 1915
C. W. Ames, Massachusetts	Dec., 1915
C. L. Sorensen, Nebraska	Dec., 1915
E. Williams, New York	Dec., 1915
W. Urquhart, New Zealand	Dec., 1915
W. Rupe, Oklahoma	Dec., 1915
L. S. Kocher, Iowa	Dec., 1915
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Sidney Stevens Imp. Co., Utah	Oct., 1915
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R. F. Watson, California	Oct., 1915
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F. Teuber, Georgia	Oct., 1915
Ed. Hammill, California	Sept., 1915
R. D. Simkins, Pennsylvania	Sept., 1915
T. J. Reynolds, Pennsylvania	Sept., 1915
Wm. Bates, Texas	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, West Virginia	Sept., 1915
Hugh L. Lynn, Kentucky	Sept., 1915
A. Chargois, Queensland, Aus.	Aug., 1915
A. M. Byfield, West Australia	Aug., 1915
C. E. Allen, Nebraska	Aug., 1915
M. J. Roder, Montana	Aug., 1915
J. E. Lyon, Texas	Aug., 1915
F. W. Krenz, California	Aug., 1915
Jos. P. Rotolinski, Massachusetts	Aug., 1915
Jas. A. Buchner, Michigan	July, 1915
G. N. Ferree, Utah	July, 1915
T. O. Chittenden, New Zealand	July, 1915
The Goldfields Diamond Drilling Company, Australia	July, 1915
J. A. Lawton & Sons, South Australia	July, 1915
I. Murray, South Australia	July, 1915
J. W. Ivil, Utah	June, 1915
E. L. Herving, Florida	June, 1915
G. R. Twedell, Mississippi	June, 1915
Schintgen & Maier, Minnesota	May, 1915
Van den Wildenberg Brothers, Wisconsin	Mar., 1915
V. Priessnitz, Wisconsin	Mar., 1915
F. J. Ties, Wisconsin	Mar., 1915
J. Marshall, Indiana	Mar., 1915
H. D. King, New Jersey	Mar., 1915
W. E. Bedford, North West Territory	Mar., 1915
J. E. Johnson, Pennsylvania	Mar., 1915
Wyndham Mauk, Ohio	Feb., 1915
G. H. Longley, Massachusetts	Feb., 1915
H. N. Seeley, New York	Feb., 1915
J. A. McGaughey, Washington	Feb., 1915
A. E. Roesner, West Australia	Jan., 1915
Alf. Seidel, Nebraska	Jan., 1915
Brown & Peterson, North Dakota	Jan., 1915
H. F. Schreiber, Pennsylvania	Jan., 1915
A. C. Elder, Georgia	Jan., 1915
C. W. Enyeart, Indiana	Jan., 1915

Ten Questions for the Month

The wheelwright and vehicle worker should be able to answer every one of the ten questions asked this month. Not one of the questions asks anything they should not know.

1.—What is the effect on a wheel when a heavier tire than is necessary is used?

2.—When ready for tiring, should the rim be up tight against the spoke shoulders or stand slightly away from the spoke?

3.—If the end of spoke tenon is much below the surface of the rim tread what is likely to be the result?

4.—What is the objection to wedging rim tenons?

5.—What are the advantages of oiling wheels—the disadvantages?

6.—When respoking a sarven wheel, is it best to remove the rivets or to notch the spokes to pass the rivets?

7.—How can you repair a wheel that is dished too much?

8.—Which practice is best, to bore the hub so the box has a bearing its full length or so it bears only at each end? Why?

9.—Should dish be built in a wheel or should it be dished by the shrinking of the tire? Why?

10.—What is meant by "pitch" and "gather"?

Many of our readers are finding these Questions and Answers of great value to them by writing out their answers and comparing their replies with the correct answers published the following month. Are you getting all you can out of this department? Let us hear from you with suggestions or criticisms.

Answers to Questions in November Issue

1.—Loss of compression may be caused by leaky valves, leaky piston rings or breaks or cracks in the piston or cylinder. It generally makes itself known by a hissing sound and the motor is hard or perhaps impossible to start. When started there is an apparent loss of power.

2.—Misfiring is caused by short circuits in the wiring or battery connections, exhausted batteries; sooted or dirty plugs, defective coil, loose terminals, faulty contact blades or faulty magnetoes. Examine the ignition system for breaks, short circuits and all likely troubles.

3.—Valve timing is the regulation of the movements of the valves so they will act properly in connection with the ignition system. If the valves do not operate at the proper moment the motor cannot operate properly and trouble will result.

4.—Dry cells can be temporarily recharged by punching a few holes in the zinc cover of each cell and immersing them in a sal-ammoniac solution for five or ten minutes. Or a strong salt solution may also be used though it is not quite as effective.

5.—The use of too much lubricating oil will cause carbon deposit. It may be removed by scraping the piston and cylinder walls or by dropping a small chain or two in the cylinder and allowing the engine to run a few revolutions.

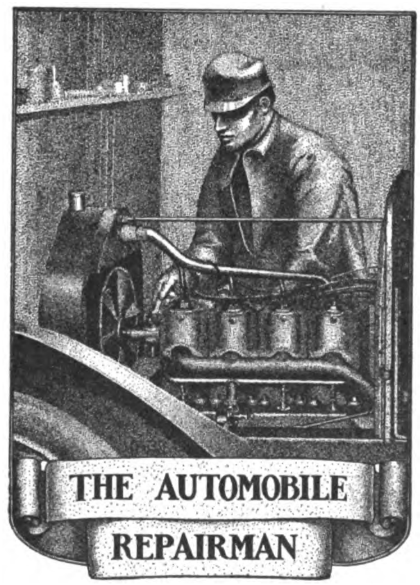
6.—If ignition fails, examine all wires closely for break or defect. Disconnect the wires at the spark plugs and touch ends to car frame. A good spark indicates that the wires are O. K. and that the plug is defective. If no spark results look to wires and battery.

7.—Smoking exhaust indicates either too much lubricating oil or too rich a fuel mixture.

8.—Explosions in the muffler are due to misfiring, disabled cylinder, choked muffler, sooted plug or faulty carburetor.

9.—If a slot can be cut in the broken screw or stud it can then be screwed out with a screw driver. A hole may also be drilled into the broken piece and the screw or plug screwed out by driving a three-cornered piece of steel into the drilled hole, or the tang of a file will answer.

10.—The motor has two valves, an inlet valve and an exhaust valve.



The Blacksmith and Auto Repairing

J. N. Bagley

There is possibly no phase of the automobile work that will puzzle the blacksmith as will tire repairs. It is not the difficulty in handling the work, but because it is entirely different from anything they have ever done. It may be well to begin our little story with the time the tire is placed on the machine. I know of many smiths who would rather do the tire repairing than any other part of auto work, because of the good pay they get and because of the change from the regular work. I have never as yet talked with a single smith who has engaged in the auto repair business that would give it up and return to the smithing business alone. The smith as well as any workman of any other craft likes variety, and the auto work furnishes this. The smith may stand at the forge until he is tired out and his work seems to be a drag before the close of day, but let an auto drive in and his mind is turned to the auto and he stops to make a few necessary adjustments, fills up the car with oil and gas, chats a few seconds with the driver, collects his fee for his work and returns to his forge seemingly quite rested.

Why Tires Go Wrong

One may ask the question why do tires go wrong? This in some instance may seem difficult to answer without treating the subject in a technical manner. In the first place the tire should be kept inflated until the weight of the vehicle does not mash it down until it "rimcuts". Casings are made heavy at the tread and lighter at the sides. Some have formed the opinion that this is wrong, but experience has taught us that the heavier a substance is, where friction exists, the greater the heat generated; thus a casing that is heavy along the sides, being worked up and down very fast as would be the case with a tire in road travel, the sides of the tire will become hot and the layers of fabric that have been vulcanized together will become over-vulcanized and become hard when cool. Consequently on the next trip the tire will not have the same elastic quality and some of the fabric will crack. Little by little it gives way to the strain until finally it results in what is termed a "blowout".

Treating the Blowout

In case the tire has a blowout and no new tire can be had to replace it, some sort of a repair must be made. A leather patch with holes punched for lacing with strings may be used as shown in Fig. 1. This should be laced very tight with the tire only partly inflated, so, as the tire is filled, the expansion will cause the blowout patch to be very tight. It is good policy to lace around a spoke of the wheel to prevent slipping if the blowout is located in such shape. If a piece of leather cannot be had large enough to make a patch it will be well to get a strap with a buckle at the end long enough to go several times around the tire and buckle up tight. This makes a repair that will run from five hundred to a thousand miles.

Placing the Inside Patch

Placing the inside patch will be somewhat more difficult than lacing the patch on the outside. In the first place an inside blowout patch to give good service must have thin

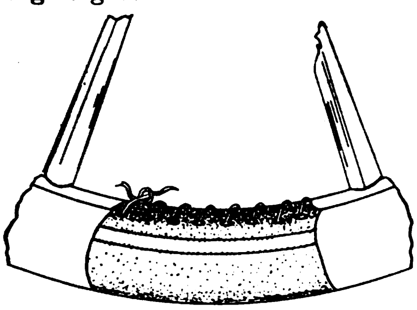


FIG. 1—HOW THE SLEEVE IS LACED OVER THE BLOWOUT

flaps extending down the sides that may pass round the clinch of the tire to the outside as shown at B in Fig. 2. This prevents the patch from crawling about and exposing the tube to the open. When placing the patch B the tube A should be inflated just enough to give it form, thus holding the patch in place while placing the tire on the wheel. If the blowout is a large one it will be necessary to place a patch on the outside as well as inside, as the strain will have a tendency to tear the hole larger, even if the tire has an inside patch. If an inner patch is to be used and no other can be obtained with wings or flaps it will be a good plan to thoroughly clean with gasoline and cement it to the inside of the casing.

Cold Patching the Tubes

While it is better to vulcanize the holes in the inner tube it is sometimes necessary that a cold patch be applied until the tire can be taken to a vulcanizer. The tube must be thoroughly cleaned with gasoline or sandpaper and a coat of cement applied to the surface. The patch should be treated in the same manner. Allow to dry a few seconds and apply the second coat of cement to the tube as well as the patch. Let this dry in the open air until it looks dull and dry. Place the patch over the hole in the tube and press firmly and the patch will stay. Do not place in a press.

Vulcanizing the Tube

Many smiths have formed the opinion that vulcanizing is some sort of magic that no one but the tire manufacturers are capable of doing. This, however, is a mistaken idea, for anyone may vulcanize a tube who has a small vulcanizer, a little cement and some raw rubber. A vulcanizer may be purchased at from seven to ten dollars that will answer very well for the small shop. A can of cement and a pound of raw rubber will include the necessary material for repairing the tires. The most important thing that we might mention in tire repairing is cleanliness, as one cannot vulcanize a patch where grease or dirt exists. After thoroughly cleaning the tire as already stated in cold patching, a coat of the vulcanizing cement should be applied and left to dry from fifteen to twenty minutes. Then take a small piece of the raw rubber and place the cement on it the same as it has been placed on the tire itself. Allow these to dry and place them together as the cold patch and they are ready for the vulcanizer. The patch should be heated until the rubber is cured. The tire should be clamped to the vulcanizer as shown in Fig. 3 with a block of wood a little narrower than the tire when laid flat. The block should have its edges and corners rounded. If the corners are square and sharp they have a tendency to cut the tire when clamped to the vulcanizer. The tire should remain on the vulcanizer about thirty minutes with steam up to about fifty pounds.

In case the hole in the inner tube is a long one it will be necessary to place a patch on the inside as well as on the outside, this is done in the same manner, but all are vulcanized at the same heat. The tire must be placed so that the patch is next to

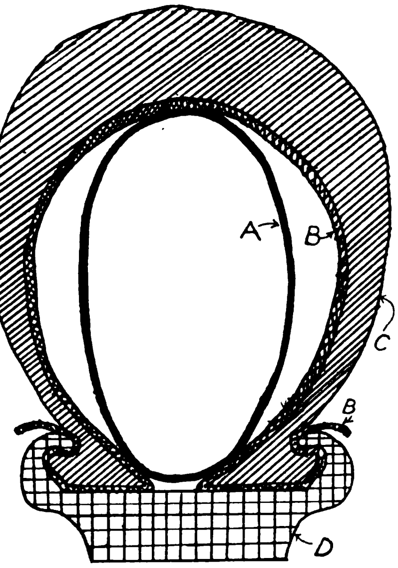


FIG. 2—HOW TO REPLACE INSIDE BLOWOUT PATCH

the heat. Clamp by degrees; that is, tighten the clamps just enough to hold the tire in place for the first five minutes or until the tire is well heated up and then tighten down a

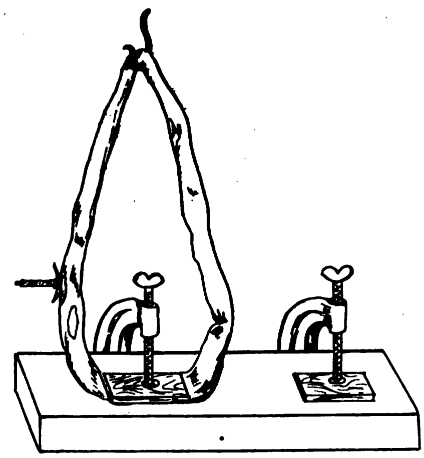


FIG. 3—HOW TO CLAMP THE TUBE TO THE VULCANIZER

little at a time until the last five minutes when it should be securely clamped. The tire should not be inflated while hot, as it will cause a bulge in the tire where it has been heated. The wood blocks used under the clamps should be hard wood and perfectly smooth.

Removing Tires From the Wheel

It seems to bother the new man more to remove a common clincher casing from the wheel than any other tire. The engravings in Figs. 4 and 5 will possibly be of benefit to the inexperienced. A shows how to begin by placing the tire tool down between the rim of the wheel and the clinch. The clinch is forced out until the tool may be forced to hold the casing as shown in B. Now, by pushing the tool a little farther in and prying down on the end, the clinch is thrown from the rim as shown in C, and by turning the tool down toward the hub of the wheel as shown at D the tire is easily taken off. To remove the valve insert the tool as shown at F and pry the casing back until the valve will come out in front of the tool. It seems that the tire proposition is the one that is holding the blacksmith back more than any other from making the start in automobile repairing. The wholesale supply houses that have sold supplies to the blacksmith for years are gradually taking up a line of automobile accessories. This is simply because they can see that the smith is entitled to this work and

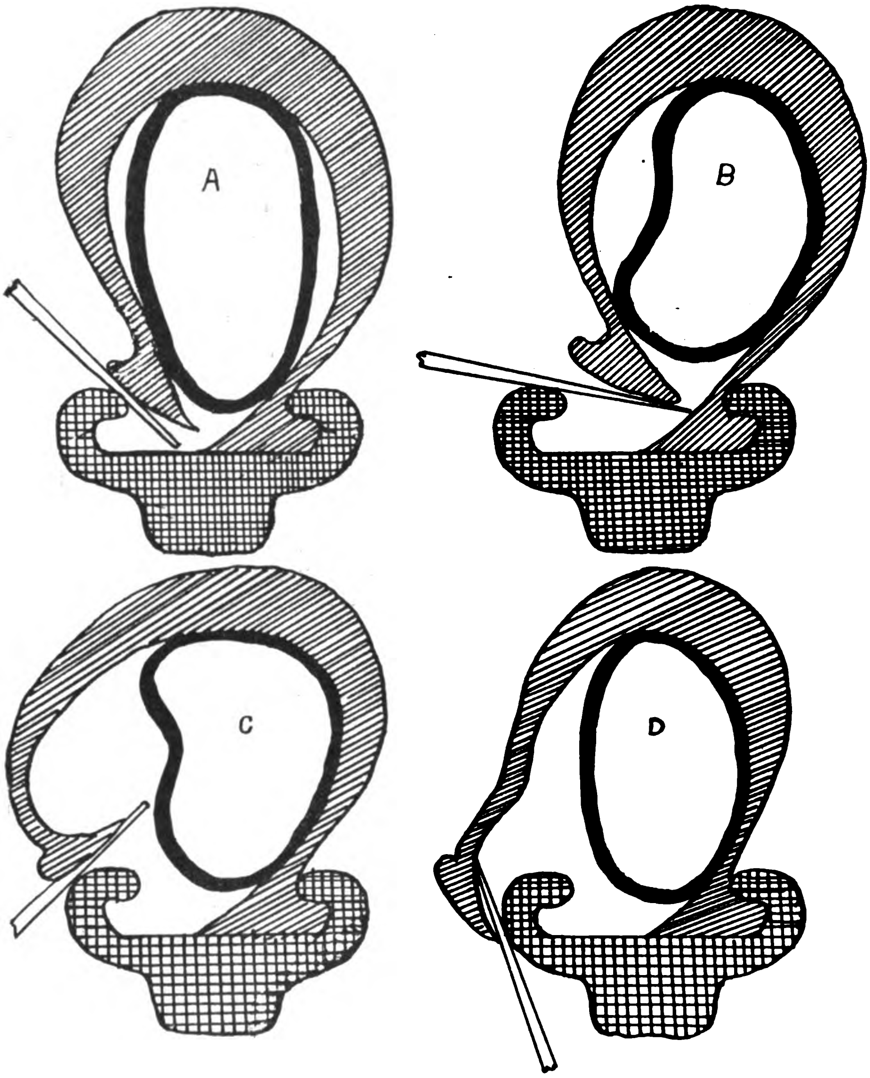


FIG 4—SUCCESSIVE STEPS IN THE REMOVAL OF A TIRE FROM THE WHEEL

they want to furnish these goods because they are pioneers of blacksmithing supplies.

The Cheap Job of Repainting

W. A. RIGGLEMAN

The best way to get at a cheap job of repainting, either buggies, carriages or automobiles, is to unhang it so that you can get at it conveniently. Some painters on a cheap job of repainting do not unhang the vehicle and this is where they lose time. Just count the time you are lying on your back trying to paint behind the springs and standing on a box to paint the top and the dirt you have to contend with. After all it will be an inferior job of painting, if done this way. A good painter would take it apart by all means. You can do better work, more pleasant work, and time will be saved, and saving time and stock is a big item nowadays, considering the prices for repainting. I have seen a few painters working with the top on and will say that I have never yet seen a clean job when finished. The vehicle with the top on takes up more room (which is an important consideration in the small shop), is harder to handle, and in the end nothing is gained but hard work to get a good clean job.

After unhanging your cheap job of repainting, number everything that is with the job, wash good and clean the grease off the gear, etc. While you are cleaning up, and when the body is dry, sandpaper the body and give the same a coat of rough stuff and white keg lead, not mixed with oil or japan. There is enough oil in the rough stuff to answer all purposes if ready mixed. Never use oil in a cheap job of painting, as you have not the time, and then this roughstuff with turpentine is ready for use. After this coat is dry, glaze or putty all over if needed. If you can get your putty on smooth, do not sandpaper as some do. Save time by just putting one or two more coats of rough stuff. Now rub down all together. You save time and that hard sanding, and you secure as good a job. Do not attempt to secure a good job by just coloring over the old paint, and varnishing. Always roughstuff your body as I have before stated. After you rub your body out of the roughstuff, sandpaper lightly. Next give the body a coat of solid covering color varnish; rub and finish.

Now use a good body varnish for the gear, if it is in fair shape, sandpaper and then give it a coat of varnish. You can get any shade or color of varnish that you wish. After the color varnish is dry on the gear, moss and stripe. Then have a good gear varnish to finish, and for this purpose there is nothing better than Valentine's one-coat coach varnish for body or gear. I notice that the Valentines are making a four-day system and, although I have never used the same, I am quite sure it is O. K., if it is half as good as their varnishes which I consider the best made, even if a little higher in price than some. Valentine solid covering color varnishes can be purchased in quart or any size cans for repair

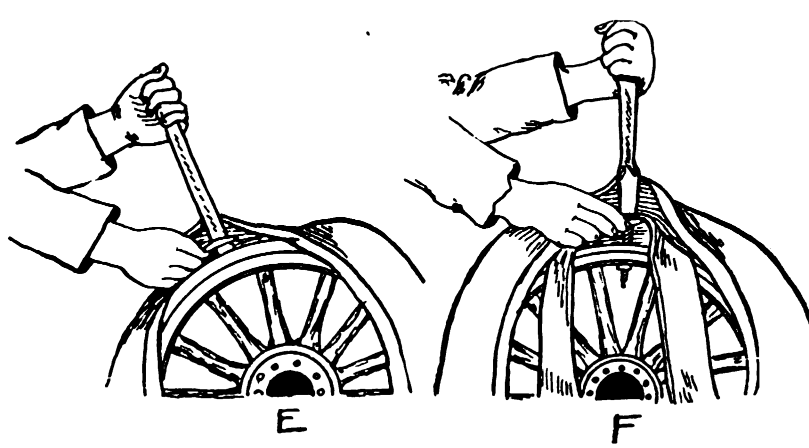
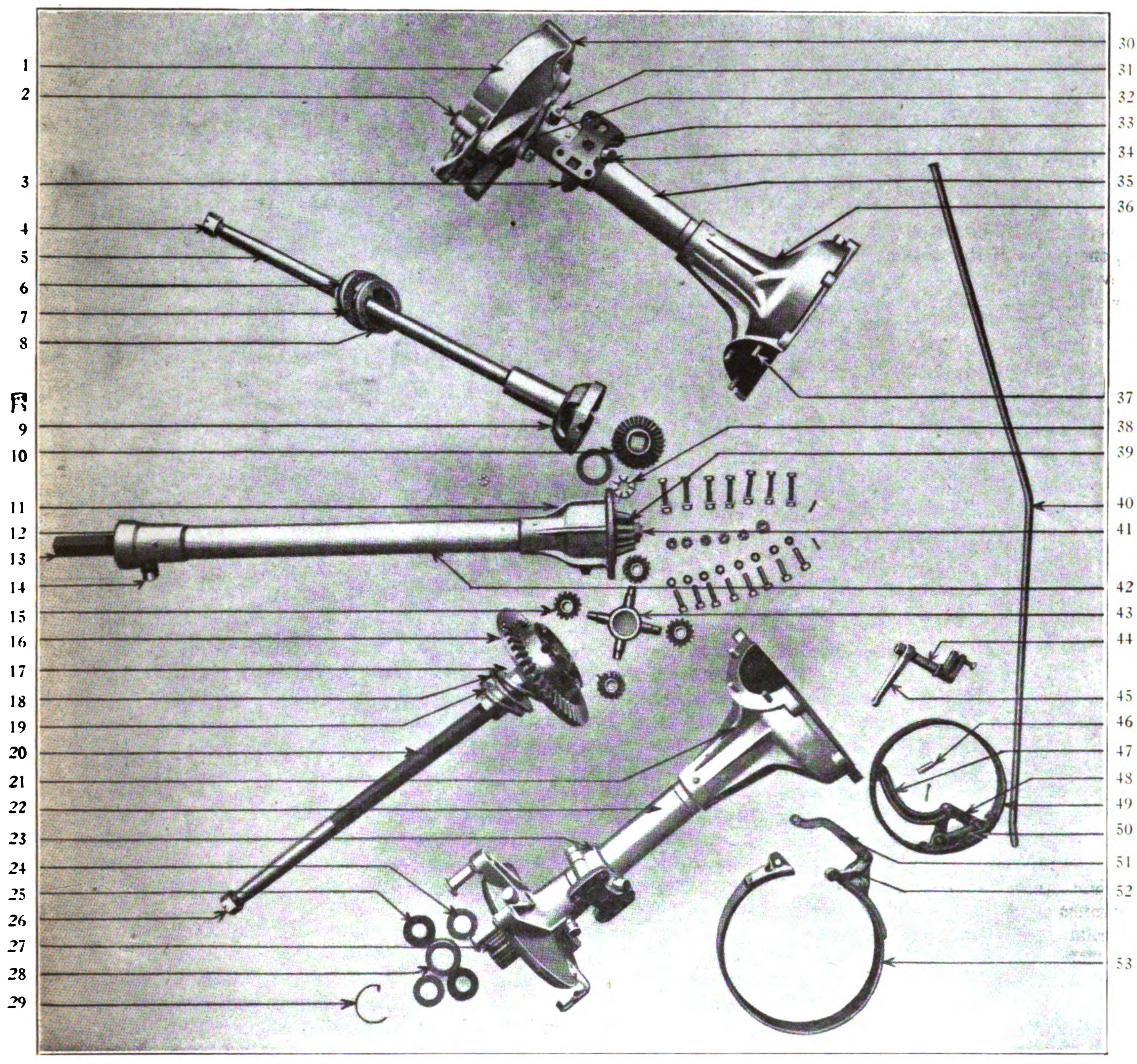


FIG. 5—FINAL OPERATIONS IN REMOVING THE TIRE FROM WHEEL

work. For new spokes, runs, shafts or anything you repair that needs a coat of paint that will cover well and dry quickly, they have just the thing extreme care. In fact, the painter cannot use too much care in producing a perfect varnished surface. You may use the best varnish made, but if obtainable. Look carefully to brushe —see that they are clean. A dirty, dusty brush cannot produce a clean varnished surface: and the same



PLAIN BEARING, REAR AXLE

1—Rear axle external brake band.
2—Rear axle external brake stop pin.
3—Rear axle spring seat cap.
4—Rear axle shaft nut—outer.
5—Rear axle shaft.
6—Rear axle thrust bearing ball race.
7—Rear axle thrust bearing ball retainer.
8—Rear axle thrust bearing ball race.
9—Rear axle differential pinion journal.
10—Rear axle differential gear.
11—Rear axle propeller shaft case—rear.
12—Rear axle propeller shaft case—front.
13—Rear axle propeller shaft.
14—Nut.
15—Rear axle differential pinion.
16—Rear axle drive gear.
17—Rear axle differential case sleeve.
18—Rear axle thrust bearing ball retainer.
19—Rear axle thrust bearing ball race.
20—Rear axle shaft.
21—Rear axle gear case—left hand.
22—Rear axle shaft tube.
23—Rear axle spring seat cap.
24—Rear axle shaft dust washer retaining ring.
25—Rear axle shaft dust washer.
26—Rear axle shaft nut—outer.
27—Rear axle outer bearing roller.
28—Rear axle shaft dust washer cage.
29—Rear axle shaft stuffing nut lock wire.
30—Rear axle external brake band retainer.
31—Nut.
32—Rear axle internal brake lever.
33—Rear axle spring seat.
34—Nut.
35—Rear axle shaft tube.
36—Rear axle gear case—right hand.
37—Rear axle propeller shaft case stud.
38—Rear axle shaft nut—inner.
39—Rear axle drive pinion.
40—Rear axle truss rod.
41—Rear axle propeller shaft nut.
42—Rear axle propeller shaft tube.
43—Rear axle differential pinion journal.
44—Rear axle internal brake cam shaft.
45—Rear axle internal brake lever.
46—Rear axle internal brake cam shaft pin.
47—Rear axle internal brake operating link.
48—Rear axle internal brake inner toggle link.
49—Rear axle internal brake band.
50—Rear axle internal brake release spring.
51—Rear axle external brake band lever.
52—Rear axle external brake toggle link.
53—Rear axle external brake band.

in small cans preventing waste. Try it. And while speaking of varnish, let me emphasize the fact that of all liquid coatings varnish demands you do not use care in applying it, and care in the selection of your working utensils, you may just as well use the cheapest grade of liquid plies to the containers for your varnish. Then the surface to be covered is also of great importance—its condition has a direct bearing on

the result obtained. It must be clean, smooth and perfect if you desire the varnished surface to be clean, smooth and perfect. If the unvarnished surface is not exactly right, don't rely upon the varnish to cover the defect. That isn't what varnish is for.

Casehardening or Carbonizing

W. F. Stanton

There are five factors which determine the result of the carbonizing operation, the nature of the steel having no influence on the speed of penetration of the carbon, but unless even and uniform heat be maintained would affect the final result of the operation. Steel containing from .012 to .015 per cent of carbon is given the preference in every-day practice and usage where it is desired to have a hard shell outside for wear and a tough core or center to withstand the shock and strain.

The factors that influence the final result are:

First—The temperature of the furnace.

Second—The time the piece is submitted to the carbonizing process.

Third—The nature of the carbonizing material.

Fourth—The heat treatment which follows carbonizing.

Fifth—The nature of the steel, the latter being more in evidence if alloy or high carbon steel be used, in which case heat or length of time affect the final result.

The table herewith may be of interest as giving the penetration of carbon per hour "as commonly accepted for various elements when present in steel."

Penetration of Carbon per Hour.
Penetration per Hour in Inches.

0.5 per cent manganese	0.043
1.0 per cent "	0.047
1.0 per cent chromium	0.039
2.0 per cent "	0.043
2.0 per cent nickel	0.028
5.0 per cent "	0.020
0.5 per cent tungsten	0.035
1.0 per cent "	0.036
2.0 per cent "	0.047
0.5 per cent silicon	0.024
1.0 per cent "	0.020
2.0 per cent "	0.016
2.0 per cent "	0.000
1.0 per cent titanium	0.032
2.0 per cent "	0.028
1.0 per cent molybdenum	0.036
2.0 per cent "	0.043
1.0 per cent aluminum	0.016
3.0 per cent "	0.008

The rate of penetration for ordinary steel would be about .035 of an inch per hour. It will be readily noticed that manganese, chromium, tungsten, molybdenum increase the rate of penetration slightly. Nickel, silicon, titanium and aluminum retard penetration.

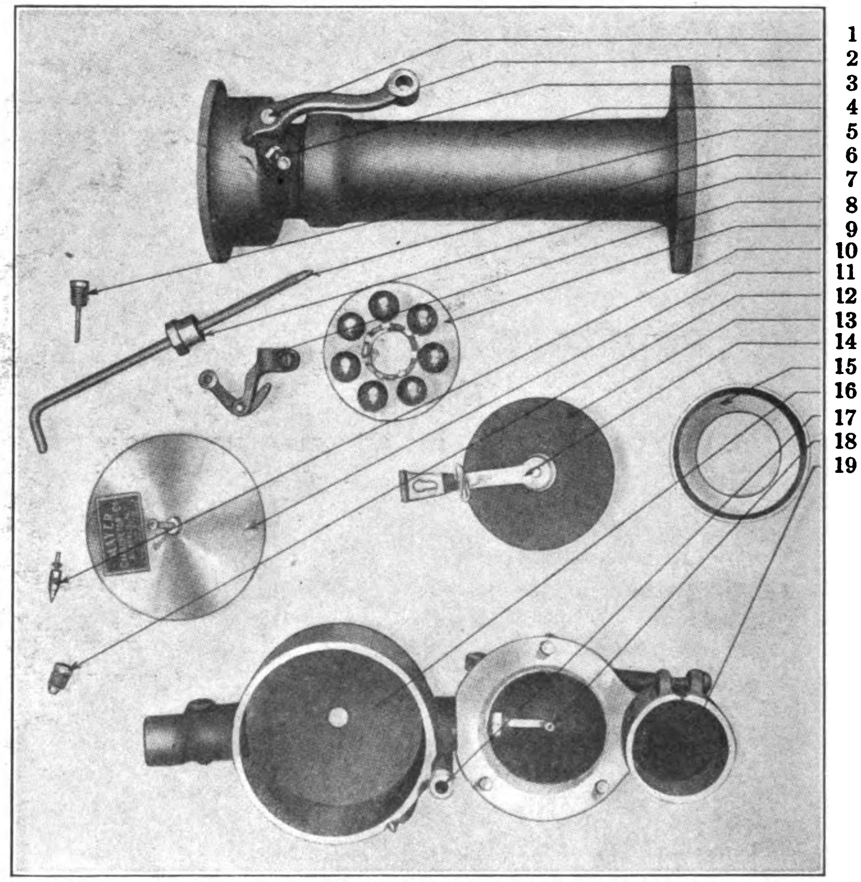
Most of the alloyed steels are made in special grades for carbonizing, dependent to some extent to what use it is intended to put the parts. To illustrate—vanadium steel that gives best results for crank shafts, connecting rods and other moving engine parts is composed o .025 to .035 carbon, .040 to .050 manganese, 1% chromium, .016 to .018 vanadium; while the best carbonizing steel has .012 to .015 carbon, .020 manganese, .030 chromium and .012 vanadium.

Good and even carbonizing depends on the degree of the temperature maintained during the heating process. It is therefore essential that the temperature be kept at a definite point as nearly as it is possible with the means at hand. If the temperature is too high the metal will crystalize and the core will become brittle.

The temperature to which the steel can be raised safely, varies according to the kind of steel being used. Ordinary carbonizing steel cannot be safely raised in excess of 1800 degrees Fahrenheit.

If the carbon content of the steel is high, even this temperature cannot be reached with beneficial results. although several of the alloy steels such as nickel-chrome could be heated to a temperature of 2000 degrees Fahrenheit, if the carbon content is extremely low, without doing any appreciable harm, and in this case the penetration of the carbon will be high without resultant crystalization of the core.

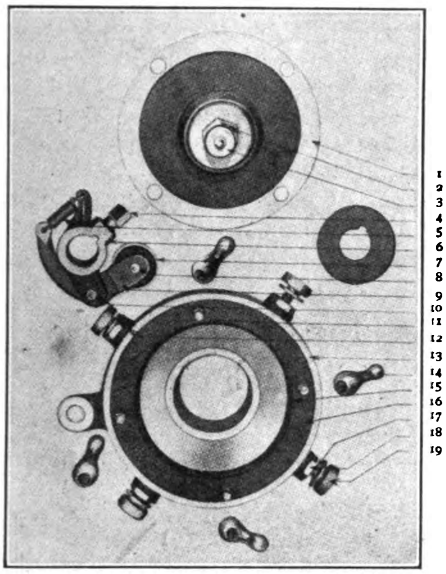
The temperature in carbonizing ranges between 1300 and 1800 degrees and should never be below, as



MAYER CARBURETOR ASSEMBLY

1—Throttle.
2—Throttle lever.
3—Throttle lever set screw.
4—Gas intake pipe.
5—Float lever hinge screw.
6—Needle valve.
7—Needle valve packing nut.
8—Primer bracket.
9—Ball valve seat.
10—Float needle valve.
11—Float chamber cover.
12—Float needle valve guide.
13—Float.
14—Float valve lever.
15—Ball valve seat cover.
16—Float chamber.
17—Needle valve.
18—Spray nozzle.
19—Air intake.

saturation does not take place and the higher heat affects both the per cent of carbon absorbed in addition to the speed of penetration.



1—Timer Cover.
2—Contact pin stud.
3—Contact block knurled nut.
4—Roller arm bracket set screw.
5—Roller arm spring.
6—Roller arm bracket.
7—Contact roller.
8—Roller pin.
9—Roller arm.
10—Roller arm pin.
11—Insulating ring screw
12—Contact block stud insulator.
13—Timer body.
14—Timer cover nut.
15—Contact block.
16—Outer insulating ring.
17—Contact block stud.
18—Contact block lock nut.
19—Contact pin stud nut.

Steel will absorb a greater per cent of carbon at a high heat than at a low one. The length of time the pieces are in the furnace chiefly affect the depth of penetration, as the table previously mentioned demonstrates, and we will not call attention to this any further at this moment.

The nature of the carbonizing material has an influence on both the speed of penetration and per cent of carbon absorbed, and material used should be of known chemical composition, as this is the only way to obtain like result on the same steel.

Materials

There are many special preparations which have value, and combinations of well known cements or carbons give good results, though some of them give more uniform results if used alone, as the operator is not subject to varying percentages as when used in combinations.

Powdered bone, charcoal, charred leather, cyanide of potassium, bichromate of potassium and many other materials give good results, and we have tr'ed a number of them on gears, slides, ball bearings, set screws, mandrels, etc., with excellent results. Hard charcoal and bone give good results on nickel-chrome steel, by packing in a box and raising heat to 2000 degrees Fahrenheit and maintaining heat for about four hours, allowing it to cool slowly before taking out of box or uncovering same.

There are several other methods, such as carbonizing in gas furnace with ammonia gas, but this is for small work only and requires expensive equipment.

Harveyizing armor—place with a bed of charcoal over the plates and the gas turned on so the steel will be heated through, allowing the carbon to soak in from the top, is a successful process. It has the fault of distributing the carbon to unequal depths over different portions of the plate and is not satisfactory for small work.

The heat treatment after carbonizing should be carefully done, owing to the fact that the piece should retain its outside hard surface to resist wear and a non-brittle core to resist strain.

Some methods of heat treating have a de-carbonizing effect, while some steels have a tendency to crack or warp. In many cases it is wise to anneal after carbonizing. This being done by leaving the pieces in the box with cover fastened on and allowing to cool gradually.

If the carbonizing temperature has not been over 1600 degrees Fahrenheit it can be allowed to cool to 750 degrees and then reheated to 1400 degrees and quenched, with good results. If temperature in heating has been over 1800 degrees the pieces should be allowed to cool to 1650 degrees and quenched and then reheated to 1400 degrees and quenched.

The reason for double quenching is that the pieces must be heated above transformation, (1650 degrees) to destroy crystalizing the brittleness which the core would be if quenched at high temperature; thus leaving the case-hardened surface layer not hard enough to resist wear, therefore quenching must take place the second time at 1400 degrees Fahrenheit.

The time which the work consumes in carbonizing under heat is an important factor, as the regulation or the given constant temperature plus the time regulates the depth of carbonization, and by proper depth is obtained the proper percentage in the surface layer desired.

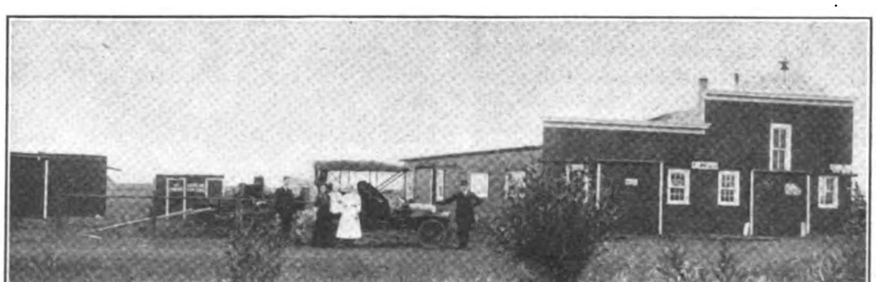
The per cent of carbon in a carbonized piece decreases from outer shell to core. The less the time of submission to heat, the greater will be the reduction of thickness of outer hard shell.

Carbonizing with materials of the nature of powdered bone, charcoal, potash, etc., by means of a packing in a cast iron box, is considerably slower than when the gases are used in a gas furnace to furnish both carbon and heat, owing to necessity of heating penetrating the cast iron box and carbonizing materials before it can affect the work.

A Talk on High Speed Steel

George Lindsay

We have heard on several occasions that since the advent of high speed steel that it was not now, as formerly, a difficult job, that the tool question had been simplified so much and that anyone could be a tool man. That is erroneous. It is true that the tool smith was always considered a crank because of his peculiarities and in being so particular about small details in his work which looked like foolishness to those not familiar with steel working. No man not an



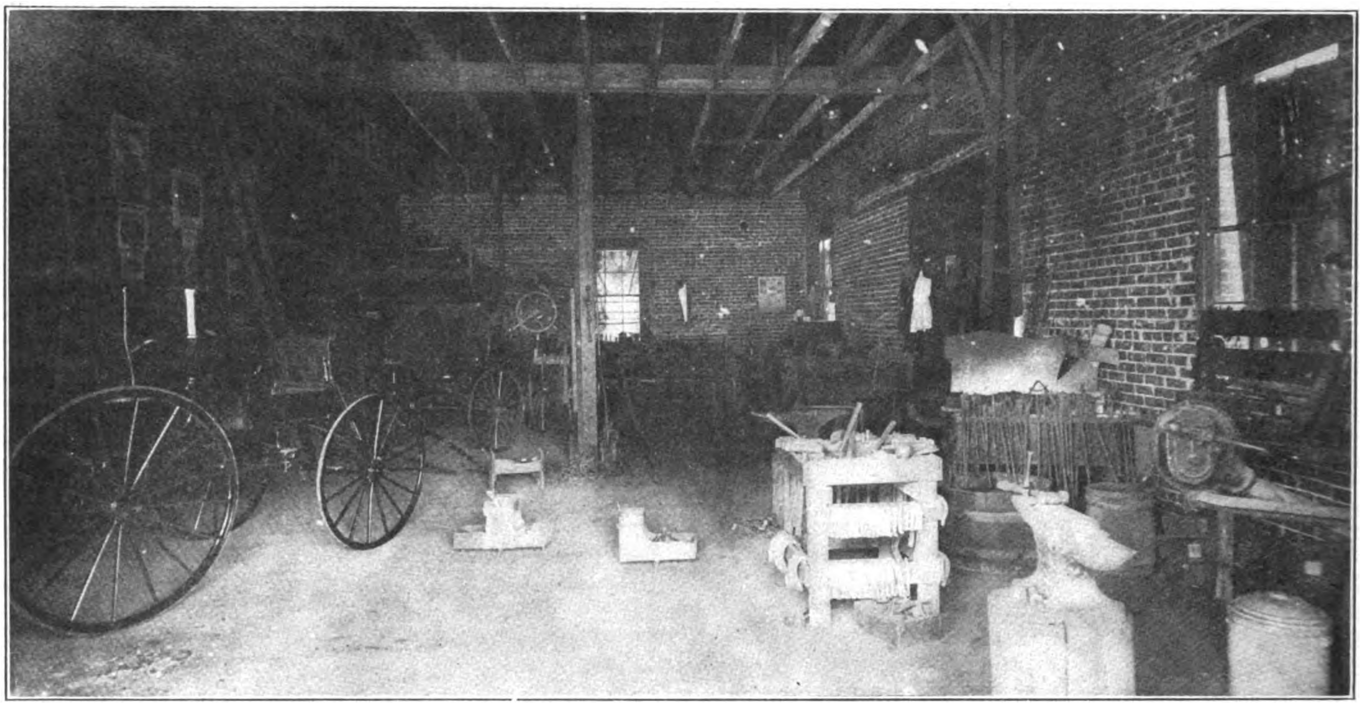
A NORTH DAKOTA SHOP, RUN BY BORSTAD BROS. THEY DO ALL KINDS OF VEHICLE, IMPLEMENT AND AUTOMOBILE WORK

enthusiast in his particular line of work will ever be a first class tool man. And it may be well said of any other line, but more so in blacksmith work. If the will and spirit are prompting the man the work is half done and he doesn't tire half so readily.

The first question I will try to reason out is the heat treatment of high speed steel. It has been said that we should burn the point off a cutting tool in order to harden it, but only the very point. This works out fairly well on lathe and planer tools, because it is not hard to grind two or three times until you get it right by feeling your way until it is ground back to where the proper heat has been reached. How often have you heard that a tool was not any good until it was ground two or three times, but you cannot get a milling cutter, a tap or reamer by that process, if you do not get the proper heat on tools of the latter class the first time. The efficiency of the tool is, if heated too high, reduced permanently, not only for wear but also in output of work which may cost many times more than the tool. We have been told that 2300 degrees Fahrenheit is the limit or critical point, and that 100 per cent of efficiency is obtained very close to the 2300 degrees. A few degrees more will reduce efficiency 50 per cent and again that 2150 degrees will again be too soft and reduce the efficiency about 50 per cent. The only sure way is to use a pyrometer, and if a close student you will get your trouble down to the minimum. The eyes of the blacksmith with all the various shades of light continuously changing, make it almost impossible to tell when the heat is just right. If it be that 50 to 60 degrees is the difference between the maximum and minimum of efficiency, who among us will say he can tell? I cannot, although I try.

The second idea I will call forging or making tools. It is surprising how unconsciously some man will hammer high speed steel at a low heat as if he were refining carbon steel before going to harden. This is good practice for a chipping chisel, but bad practice on lathe tools. It is also important that high speed tools be so forged as to have a good backing of metal in order to carry away the heat by absorbtion into the heavy backing. While it is also very important to reduce the cutting area of tools to reduce the friction as much as possible, a machinist that knows his business can very often help tools in grinding.

Then as to hardening, wherever it is practical to use compressed air as the cooling medium I use it. True that oil can be used, too, on some such tools as cannot be very well evenly cooled with air. Hot salt water may be used in cases of emergency, but I don't like it. On threading dies I use air in preference to oil. Oil is good by drawing down afterwards to a golden color or a little lower. But get the hardness by the proper heat in the first place, then experience will determine as to whether it is too hard or not. In the drawing of temper, we read of the elements composing the alloys into high speed steel being eliminated by the high heats used in hardening. I will leave out this at present, as I expect our chemist friends will tell us all about it.

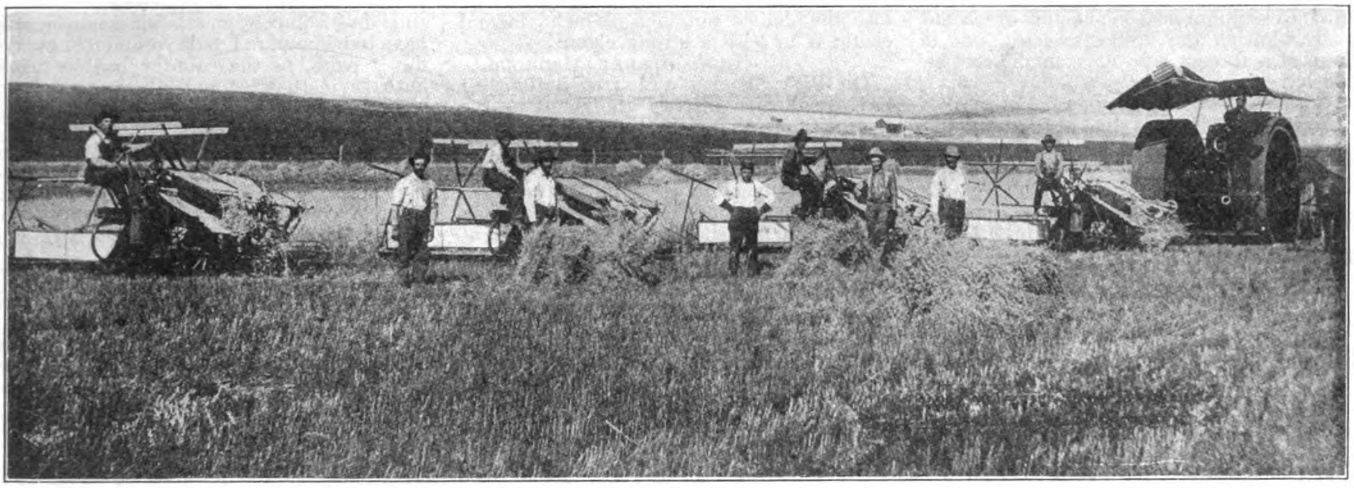


MR. R. M. McCLURE'S TEXAS SHOP, WHERE HE TAKES CARE OF ALL KINDS OF GENERAL SMITHING, WOODWORK AND HORSESHOEING

A Benefit Fund for Horseshoers and Their Families

A fund for the benefit of needy horseshoers and for the needy families of deceased horseshoers has been established by The Rowe Calk Company, Hartford, Connecticut.

This we believe is the first fund of any sort that has ever been instituted in the United States among or for the benefit of horseshoers. In most branches of physical endeavor there are organizations and arrangements made for taking care of the needy ones in various ways, but we believe there is nothing of this kind among the horseshoers. There are, of course, unfortunate ones in this calling as well as in other trades, and The Rowe Company should certainly be congratulated and sincerely thanked



A TRACTION ENGINE PULLING FIVE BINDERS CUTTING A SWATH OF FIFTY FEET

for their foresight, kindness and big heartedness in this instance.

This fund will be under the control of three trustees, the following board having already been agreed upon:

Mr. Wm. A. King, president, Elmwood, Connecticut, horseshoer at the Charter Oak Racing Park at Hartford.

Mr. Warren J. Stecker, vice-president, Hartford, Connecticut, horseshoer at 52 Sixth Street.

Mr. Andrew J. Broughel, secretary and treasurer, Hartford, Connecticut, lawyer.

The fund will be made up by deposit by The Rowe Calk Company into the hands of these trustees of 2½ cents for each Ring Point box label sent to the trustees by a horseshoer. These labels must be from the top of the box and they must be unmutilated and easy to read, showing the number stamped upon it at the factory. With each set of labels sent to the trustees, the horseshoer must send a small statement on a form furnished by the trustees. This will be filed away to show that the horseshoer is entitled to the benefit of the fund if he should ever apply. The trustees will furnish the horseshoer a certificate showing that he is entitled to the benefit of the fund.

The schedules of payment made under this fund are as follows:

1.—To any needy horseshoer qualified, who is incapacitated by sickness or accident, the sum of $5.00 while so incapacitated for not more than five weeks, upon the statement of a practising physician.

2.—If the needy widow or family of a deceased horseshoer, qualified, not able to pay his funeral expenses, the sum of $25.00.

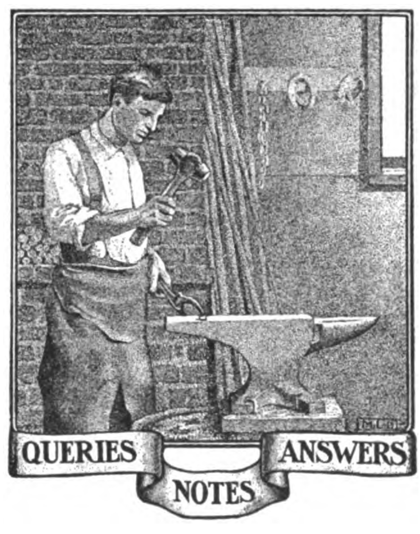
3.—If the needy widow of a horseshoer, qualified, not able to support herself, the sum of $3.00 a week for not over eight weeks following his death, unless more money in the fund is available and, in that case, for not more than sixteen weeks. If such needy widow has dependent children, less than twelve years old, the extra sum of $1.00 a week for each such child not exceeding two for such period.

4.—At any time within one year after the death of a horseshoer, qualified, the needy widow of such horseshoer, who is incapacitated by sickness or accident, the sum of $5.00 a week while so incapacitated for not more than five weeks, upon the statement of a practising physician. Such payment provided for in this section shall be in place of those specified in section 3, if such incapacity occurs while the payments specified in section 3 are being made.

5.—At any time within one year after the death of a horseshoer, qualified, to the needy widow of such a horseshoer who has a dependent child or children less than twelve years old, that are under the care of a practising physician, the amount of the doctor's bill not to exceed $3.00 a week for any one week's service for a period of not more than five weeks.

6.—If a horseshoer, qualified, dies without a surviving wife, but with one or more children less than twelve years old and such children have no relatives to support them, the sum of $1.00 a week will be paid for their support, not over twenty-five weeks for each one and not exceeding two.

The company advises that labels may be sent in at once, either from last year's or this year's stock. Payments will begin upon claims arriving on or after January 1st, 1912. In order that the beginning may be successful, The Rowe Calk Company will guarantee the accumulation in the fund of at least $1,000.00 for payment during the first year of its operation, if claims amount to as much as that



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Why Do Springs Break?—I would like to ask brother craftsmen why a spring breaks off at the end of the lap after being welded. I can weld a spring perfectly at one heat, but sometimes they break off short.

L. O. PLEDGER, Georgia.

To Overcome Coal Troubles.—In answer to Mr. Frazell in the October issue, if his

trouble is sulphurous coal he may overcome it by blowing the fire extra hard, but if there is a foreign substance in the coal he will have to get it out.

E. B. JONES, Missouri.

Wants Plow Information.—I would like to see a little written about plow work and less about horseshoeing, as I have a big run of plow work. I would like to know more about it, especially how to harden the lays, as there is much call for such work. The horses go without shoes here.

O. H. GOTTENBORG, North Dakota.

On Vulcanizing.—In answering Mr. A. A. Blochberger's question on automobile tires, if he has much of that work to do, I would advise him to get a National garage steam vulcanizer or a National steam portable vulcanizer. Full information concerning these machines can be obtained from the National Motor Supply Co., of Cleveland, Ohio. GEORGE J. COONEY, New Jersey.

Shoeing for Forging.—I would like to explain my method of shoeing for forging. I have been at the trade forty-eight years and am still working, at seventy-five. To prevent forging use a toe-weight shoe. Shorten the foot so as to lengthen the stride. Use a very light shoe on the hind foot. This method has never failed to effect a cure.

W. B. STEVENS, New York.

Wants Saw-Gumming Information. — I would like to see an article in THE AMERICAN BLACKSMITH on the gumming of circular saws, illustrated and giving the details as to marking out the saw, size and thickness of emery wheels to use, and a description of the contrivance for holding the saw while doing the work. I wish to use a common emery stand for the work.

LUKE BLABEY, Manitoba.

Removing That Shaft.—In answer to Brother T. G. Steadman's question on how to get out the jack shaft of a McCormick mowing machine I wish to say: Drill a small hole through the casting into the shaft or drill through the oil-hole into the shaft. Then stick a pin into the hole to hold the shaft; remove all gears in the back case. Then take a flat punch, back off the cog wheel and pull out the shaft.

JOHN SHERRY, Florida.

Treating a Case of Dropped Sole.—I find on page 23 of the October issue that Mr. J. B. Chappell would like to receive some pointers on shoeing a case of dropped sole. The following I am sure is a satisfactory method for treating cases of this kind: Take a heavy-heart bar shoe, concave it as much as necessary so that it will not touch the solar tendons and still rest fairly well on the frog of the foot. Do not draw up the nails too tight.

HUBERT G. LEY, Minnesota.

On the Welding of Axles.—I am indeed very sceptical when I read how Mr. McGill in the September number tells how he welds axles. I'd like to see him weld with our Southern coal without a compound, sparkling heat, sand or something else. I weld them so they don't come off, but I get a welding heat on them whether they have any of the useless compound or not. I find chips from the lathe mixed with borax about as good as anything I can use.

MARK C. HARNED. Tennessee.

Removing the Jack Shaft.—Replying to Mr. T. J. Steadman's question as to how to remove a jack shaft from a McCormick mower I would suggest that he drill and tap for a set screw over the shaft. Use a taper tap, then a bottoming tap. Next turn off the pinion a little at a time as far as the bevel gear will allow it to go. Tighten the set screw to prevent the shaft from turning.

Another way would be to drill about $\frac{11}{16}$-inch hole through the casting part way into the shaft; put in a $\frac{3}{8}$-inch pin and clamp it in with a strong clamp.

LUKE BLABEY, Manitoba.

On Fast Shoeing and Tire Setting.—I have read with interest the items of the two fast horseshoers, one in Texas and one in Iowa. I have a man shoeing for me here in Madisonville, Texas, that can drive four shoes in four minutes, without trying to make a record, and he is perfectly willing to meet the fast shoers above mentioned at any time.

I have just read the item of Brother W. K. Huff on cold tire setting, and I will say to him that I have a Brooks cold tire setting machine, and that I can set a tire in three or four places around the wheel, the tire having the same tension all around the wheel. If it was knocked off the wheel it will be found to be $\frac{1}{4}$ to $\frac{3}{8}$ inch smaller than the wheel. I never kink a tire, no matter how thin it is. A. T. WRIGHT, Texas.

Other Cases of Drop Sole.—I have the same trouble here with a great many of the horses as does Brother J. B. Chappell, of Alabama, and would like very much to hear from someone who can tell me through the columns of the paper what can be done for it. I dare not pare the foot as far down as it should be, as it starts to bleed.

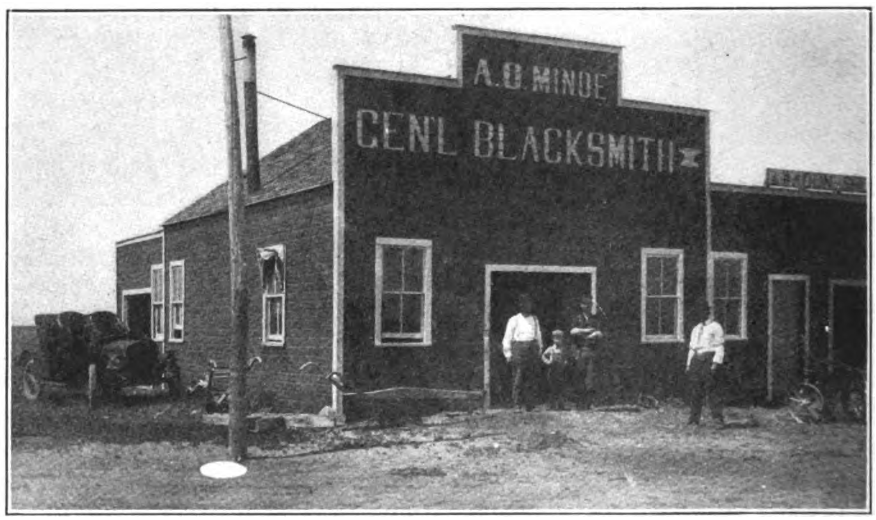
I have been in British Columbia since July and find it greatly different from the States. It seems that everyone knows how a horse should be shod, or thinks he knows as much as the blacksmith, and they are a class of people hard to please. But I must say that in spite of everything I have to contend with. I have enough work to keep me busy. There is one other shop in town, but it is doing practically nothing. I do all my own work, except when extremely busy; then I have a dandy helper—my wife—who also keeps books for me and takes care of all my correspondence.

G. M. BASSETT, British Columbia.

A North Dakota General Shop.—I wish to give to Brother T. J. Steadman, of Florida, the kink I use to remove the small gear from the jack shaft when the shaft is broken in the casting. I drill a small hole through the casting and into the shaft, and then with a small punch you can easily hold the shaft and turn the gear off. It is very seldom necessary to drill into the shaft more than once. I find that when once started they turn off easily. A small plug can then be driven into the hole to keep the oil in.

I enclose a photo of my shop. I do all kinds of repair work, woodwork and also auto repairing. I like auto work and am getting my share of the trade. I think the time has come when all blacksmiths will have to be prepared to do common or everyday repairs, as the country has so many autos and they cannot always get to a garage without a considerable loss of time.

A. O. MINDE, North Dakota.



A GENERAL SMITH SHOP OF NORTH DAKOTA RUN BY MR. A. O. MINDE

How to Shoe a Striker.—In reply to Brother Wm. Peot, Wisconsin, in the October number, take a position directly in front of your horse (sit right down on the floor); study the position of the legs and feet. You will probably find that she does not stand plumb. This being the case all you have to do is to square her up, that is, trim each hoof so that a plumb line suspended from the center of the leg at the shoulder would line to the center of the toe. This may be easier to write than to do, as you may not be able to trim the hoof enough to bring the foot into line. In this case you will have to make a shoe thick on one side to bring the foot up level. If your horse toes out, as is often the case with knee bumpers, don't be afraid to toe her in enough to bring the foot into line with the leg. E. A. CORNELL, New York.

That Case of Drop Sole.—In answer to Mr. J. B. Chappell, Alabama, regarding dropped sole, would say that I have had to shoe horses with this complaint myself, but have got them in good shape again in about one year. Make a wide web bar shoe and concave it good so it will not touch the sole of the foot. If there is frog enough to put on pressure do so and calk your shoe, but not too low. Now take a steel plate about $\frac{1}{16}$ inch and cut it the shape of your shoe inside the crease and put it on with four or five rivets on the crease side of your shoe. Now pack your foot good with tar and oakum and nail on your shoe with big-headed nails so you can pull them when you want to take off the shoe. But pack the shoe good so no mud can get in and use a toe clip so the shoe will stay on longer. Leave the shoe on two months at least, but keep it tight so it will not work in the foot.

I have had good luck with that shoe and you will if you use it right.

CHAS. J. THURBER, New York.

Shoeing Horses and Welding Axles.—I have been a reader of THE AMERICAN BLACKSMITH for about eight years and will say that I think it is a great journal for the craft, and by reading it one keeps in touch with the best mechanics all over the world. I have learned a great many things from "Our Journal."

Mr. J. C. Weaver's "Shoeing the Horse Correctly" should be appreciated by every shoer, and if every shoer will follow his plan they will gain thereby.

I beg to differ with Mr. R. A. McGill, regarding welding compounds. I have used several kinds and find them all good, "Climax" being my choice. I have done a great deal of axle welding. I find a compound a great help not only in axle welding, but in all other classes of welding. Where Mr. McGill "fell down" in using a compound was that he did not use it right. If properly used I find it a great help, as it contains cuttings or small particles of iron which melt on the steel and make a rough, sticky surface which sticks as soon as it touches and thereby prevents slipping. Outside of his condemnation of welding compounds Mr. McGill's plan for welding axles is very good. R. C. JOHNSON, Kansas.

A Letter from Tennessee.—I am well pleased with "Our Journal." There is much information that is good in the letters from brother smiths and, of course, some things which are not, but I am willing to take things as they come.

I have enjoyed the discussion between Brother Huff and others about hot and cold tire shrinkers and am glad that he has acknowledged that the tire is not smaller when on the wheel than the wheel is.

I have had considerable experience in the last eighteen years shoeing colts with deformed front feet, high heel and short toe. I take a piece of buggy tire and split it, leaving a projection in front. Trim the heel down low and nail on the shoe in the regular way. The toe should be turned up just a little. I have never failed to cure a colt in this way in from three to twelve months, but you must begin while the colt is young and growing.

I own my own shop and house. I use a Black Giant shrinker, a punch and shear combined, which does good work, a No. 400 blower and a Reynolds Tire Bolting machine which saves time and money.

WM. V. GIST, Tennessee.

A Talk on Shoeing.—I notice in a recent issue that Mr. William M. Peot, of Wisconsin, asks how to shoe a horse that strikes at the knees. I have had a number of horses do this and have stopped them by taking a very light, plain shoe of about eleven ounces. Dress the foot, leaving the inside toe very full and higher than the outside toe.

Now with reference to the case of drop sole feet mentioned by Brother J. B. Chappell, of Alabama. I have had considerable experience in this line and believe this is to be an instance of founder caused by too much grain, and my best advice is to turn the horses out, taking the shoes off. But if the owner insists on using them, take as narrow a shoe as possible and concave it so that it will not press the sole of the foot. Cut a very light calk, take a piece of 1⅛-inch Norway iron or soft steel and weld across the shoe between the first and second nail holes at toe and use as small a nail as possible.

I give the above advice to my brother craftsmen, as I have found that it has worked very satisfactorily in a number of cases which I have had to deal with.

W. E. NIXON. New Jersey.

On Tire Setting.—Replying to Brother Huff, with his offer of $100, I have done wheel work for thirty-five years and I have no money to put up; neither have I learned it all. I have cut and welded, shrunk them hot and have set them by the cold process and I find that we have many things to consider. First, climatic conditions; second, the condition of the wood in the wheel; third, the dish of the wheel and, fourth, the weight of the tire. For a good solid wheel, with very little dish, all that is necessary is to give your tire plenty of draw and you have a good job. But a loose wheel, open at the joints, is altogether a different proposition, for you must saw or rasp the wood until sound. Then you have to fill in until the wheel is the proper size. You may now have a tire that appears smaller than the wheel. Warm the tire, but not hot enough to scorch the felloes; place it on the wheel and let cool without soaking in water. Place it then in the cold tire setter and draw until it rings like a bell and you will have a solid wheel and one that will last.

My advice to brother craftsmen is not to talk about their work, but to let their customers praise this for them. I have been here for four years and am turning out eight times the work now that I did four years ago, which is a proof of the satisfactory work which I am turning out.

I would like to ask why tires on new wheels are set by the cold process?

J. A. RAPER, Illinois.

More Tire-Setting Talk.—Mr. W. K. Huff wrote an article in THE AMERICAN BLACKSMITH, October issue, which strikes me that he does not know the slightest principle about tire setting—that is, scientific—nor about the action of the metal and material you are using. Now, I do not speak for either hot or cold tire setting. When you set a tire cold, you draw the tire and the wood together at the same time. Now this is a fact, but bear in mind that the wood upsets and holds tension on the tire. You have the same action on the tire and wood when shrunk and heated, for the tire does not set on the wheel rim or wood until it begins to cool. Now, here is where your cold tire setting commences. When your tire cools off it begins to draw tight on the wood, and as the tire shrinks the wood will have to shrink also. No matter how much shorter you have made it than the wheel, the wood will have to give with the tire, as it draws around the wheel. You speak of locomotive wheels. They are an entirely different proposition. These tires have to be treated just the same, but as you have a cast-iron wheel to act on there is not so much give to the wheel. There is some, however, for there is a gap left in the rim on those wheels. You warn Brother Jeff about cold tire setting, not to let his customer hear about how much money he can make with his cold tire setter. This he need not fear, for you can do good work with them as well as setting them hot. Poor work can be done in both instances. Now, Mr. Huff, you seem to cast reflections on other smiths. But I concluded by your letter that you might have done what you throw up to Brother Jeff. You seem to have $100.00 which you can wager on the cold tire setter proposition. I do not know where you live or in what locality you are doing business, but you will find some place where you can get two new wheels, one set hot (as you call it), the other set with a cold tire setter. Knock off the tire, measure both wheels and tires and you will find that there is just as much tension on either tire, and the tire on both wheels will be found smaller than the wood by measuring. Now quit your blowing, for it certainly looks windy to me. If you do not know find out by experience and do not cast reflections on others of the craft because some one is better at the pen than the anvil. I take the man with the hammer and brains every time to do the work in a smithshop.

OSCAR CARLSON, Nebraska.

Fast Shoeing and Drop Sole.—Some smiths place great emphasis upon fast and rash ways of doing work, which really does not give a man time to use good judgment and to know that his work is done right. Years ago a smith was called a good mechanic when he hustled and overworked himself trying to do two men's work each day. In shoeing many a poor horse is ruined through such rushing, the shoer never having time to study anatomy and structure and the function of the feet, but they wish to impress the idea that they are qualified as horseshoers. I fully believe that four horses a day are enough to shoe on an average for one man, that including hand-made shoes, bar shoes and all the necessary work to do good shoeing, keeping the horses comfortable on their feet and in sound traveling order. At this rate of four horses a day, with say an extra shoe each day, would make twenty-five horses a week, 1200 in a year, or 4800 shoes in that period, which at $1.75 a horse would mean an income for the twelve months of $2100.

Replying to Mr. J. B. Chappell would give the following advice for taking care of the horses with drop sole. In the first place, what is wrong with the feet? Were they foundered? This is the most likely cause for drop sole, or in other words the laminae is dead, the outer wall separating and spreading and finally turning up. If such is the case, you must put the weight on the frog by making a shoe with frog pressure. To this fit a plate with set screws to go on the bottom of the shoe, but don't have it touch the sole. Pack with pine tar and clean cotton, renewing the packing each week. Rub thoroughly with glycerine around the coronary band. In treating the foot in this way don't pare the sole, but keep the foot shod to the proper angle according to the pastern bones. In about twelve months or so you will see a marked improvement, but don't expect them to become perfect again. ALBERT MEIER, Pennsylvania.

Axle Welding and Tire Setting.—I see Sanford E. Frazell, of Nebraska, is having trouble with welding axles. I think from his letter that he is using poor coal and not preparing his fire before placing his work therein. Mixing raw coal in the fire will cause any steel or iron to weld badly. Also, he does not say what kind of a blower he is using. It may be that he does not secure his heat quick enough, keeping his work in the fire too long, causing a scale to form, thus preventing it from uniting. I have a great deal of this work to do, but never have to take a second heat to get it to stick. I take about three heats to finish a weld in putting on new points. As to the kind of material the axle and point are made of, they are the same.

Judging by the letter of Mr. Huff on cold tire setting, he has no setter. If he would purchase one and use it a while I think he would change his mind. Probably all the cold tire setting Mr. Huff has seen was done by inexperienced men. If, therefore, the work was not all it should be he should not blame the machine. Some men think that when they buy a machine to do a certain work the machine will complete the job without any further thought or skill on their part to operate it. This, however, is not true. I am sure that it is just as well to put the tension into a tire with a cold setter as to heat it and put it on the wheel and cool it to cause contraction. It requires good judgment to take all wheels as they come and do a good job every time, but it is up to the operator to use judgment, start right, etc. So, give cold tire setting a trial before condemning it. I have set over one hundred and sixty-eight tires at fifty cents each, and built over one hundred new wheels on which I set the tire cold since May 20, 1911, and to my knowledge have no dissatisfied customer. My tire-setting trade is growing faster than any other part of my business and I strongly feel that the man and not the machine is at fault when a bad tire setting-job is turned out.

R. R. NORRIS, Alabama.

More on Cold Setting.—In reply to Mr. W. K. Huff, regarding cold tire setting, I wish to say that I have had a cold tire setter for the past three years, and it has given entire satisfaction. If you set a tire

cold and then knock it off the wheel you can soon tell how much smaller it is than the wheel. Have the wheel straight, lay it down, pull dish in it; have the tire set cold off of the wheel, have the dish pulled in and place the tire right on the wheel cold. The dish holds the tire tight, but a great many smiths think the wheel is rim bound, saw it out and dish it still more.

Many smiths get poor results with cold tire setters because they do not know how to operate them. They do not draw the tire tight enough, or else attempt to draw it in two or three places, whereas it is much better to draw it only in one. Then, again, a smith who is not in position to buy a tire setter is sure to "knock" them. We have such a craftsman here in this town who declares it is impossible to set a tire tight with one of these machines, but practically all the tire setting of the town is done in my shop. My advice is to draw the tire tight enough and the work will be satisfactory. J. R. JONES, Texas.

ought to know what they are writing about, so they won't bore others. The only thing that bores me is to hear a man boast of doing such work in a certain length of time. It may be that if the wheels are good and solid he probably could do a quick job, but it will not work on old wheels. Until our fire three weeks ago we used a cold tire setter. It was a good machine, but I have found them all a nuisance to the shop and the whole community where they are installed. The first reason is they don't give satisfaction because you never get to set the same tire twice with one. The customers won't stand for it. They want a job done right. And the second reason is that I never have seen one that ever paid for itself. The makers always put out advertising to set the people's tires at half price, and some or most of the smiths are soft enough to cut the prices on this work to satisfy the ambitions of another.

Yes, I think, Brother Smiths, if you want a dead one on your hands and have some money just put it into a cold tire setter, but curse no one but yourself.

L. E. PHIFER, South Dakota.

How a Texan Built up a Business.—I came to this town and started in business without any experience except as a millwright. The first things I bought were a band saw, a wood lathe and a gasoline engine. I started in the woodworking business and six months later I took in a partner who had a blacksmith shop, and we combined the shops. Two years later I bought out my partner and continued in the business, putting in a punch and shear, a 15-inch machine lathe, a 10-horsepower engine, a grist mill, two forges, a spoke boring machine and all the small tools necessary, also a large drill press, bringing my equipment up to $2,000. I do a big credit business and sometimes lose quite a big bill by some fellow going bankrupt. But I profit by the experience and watch more closely and find out from my associates what the financial conditions of my customers are. We have a commercial club of which I am a member. It enables me to extend my trade to a larger territory and to become acquainted with more business men. I have plenty of competition, but we work together fine, as each competitor has worked for me for wages. When I find that I am not competent to do a line of work I hire a first-class man, pay him as high as $100 per month, if necessary, until I can handle that class of work myself or, if it justifies, I keep him as long as he likes, which is from three to four years.

As to the credit business it is all right if you know what you are doing and watch every customer. You cannot approach two men alike in collecting accounts. When you find a customer is no good cut him out—don't make any difference how much he owes you, watch your chances. If you are not a collector do a cash business. Sometimes a smith will ruin a good customer by taking produce as pay. That man will soon expect to pay you only in produce. Cut him out and give him to understand that you divide your trade among your customers.

Charge plenty for your work; be your own price-maker; do good work; be independent; always have something to do; have a side line. I make a great deal of money on ice boxes, screen doors, window frames, watering troughs and anything that I can make a profit on the odd time. I always keep two to three men, and sometimes four. THE AMERICAN BLACKSMITH is a great help to the smith in various ways. The advertisements are as much help to the smith as the reading. I think an advertiser receives better results by having a cut of the machine or tool with the advertisement. F. A. WILSON, Texas.

THE TRUCK FARMER FINDS THE AUTOMOBILE AN EXCELLENT MEANS FOR DELIVERING HIS PRODUCE QUICKLY

Curing Forging and a Talk on Cold Setters.—D. F. Castles, of Missouri, asks a question on forging. When a horse forges, it is evident that his hind feet are three quarters of an inch or more shorter than the front feet, i. e., from the coronet to the extreme bottom of the toes. To remedy this, cut the front feet level, lower at the heels, if anything, and use a long shoe. Set the toe back on the shoe to give it roller motion. To shoe the hind feet, just trim the heels as low as they will possibly stand, and shoe with a long shoe, putting the toe to the extreme front edge of the shoe, leaving the toe higher than the heel calks. Let the shoe extend out in front of the toes and you will find your horse will not forge any more.

I see some men are timing themselves on using tire setters. In the first place, a cold tire setter cannot be hurried. People

TIMELY TALKS WITH OUR SUBSCRIBERS

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Arrangements will also be made with the secretaries of the larger associations to handle AMERICAN BLACKSMITH Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

Our Big Stick

Lots of ads these days there are which should never be answered, but you'll never find any of them in the columns of THE AMERICAN BLACKSMITH. Our Pink Buffalo Protection Stamps and Our "Honest Dealings" Paragraph insure this. We insure you against the unfair business houses. They show the swindler that we are ready to use a "Big Stick" on him if he does not treat you honestly.

These Pink Buffalo Stamps are supplied to subscribers of THE AMERICAN BLACKSMITH at no cost. They are expected to use them on all letters going to jobbers, manufacturers and business houses of all kinds. They assure you of our protection should you need it. The "Honest Dealings" Paragraph is published in every issue of THE AMERICAN BLACKSMITH and assures you and guarantees to you the reliability of all firms advertising in the columns of THE AMERICAN BLACKSMITH. If you are unfamiliar with this guarantee paragraph, look it up now in this issue and make yourself familiar with this guarantee. We also want you to use the Pink Stamps freely and ask for more when your supply is low. If you are not familiar with the protective insurance offered to subscribers of "Our Journal," ask about it. We are always glad to explain any features in connection with THE AMERICAN BLACKSMITH Service to Satisfy Subscribers.

Contents, January, 1912

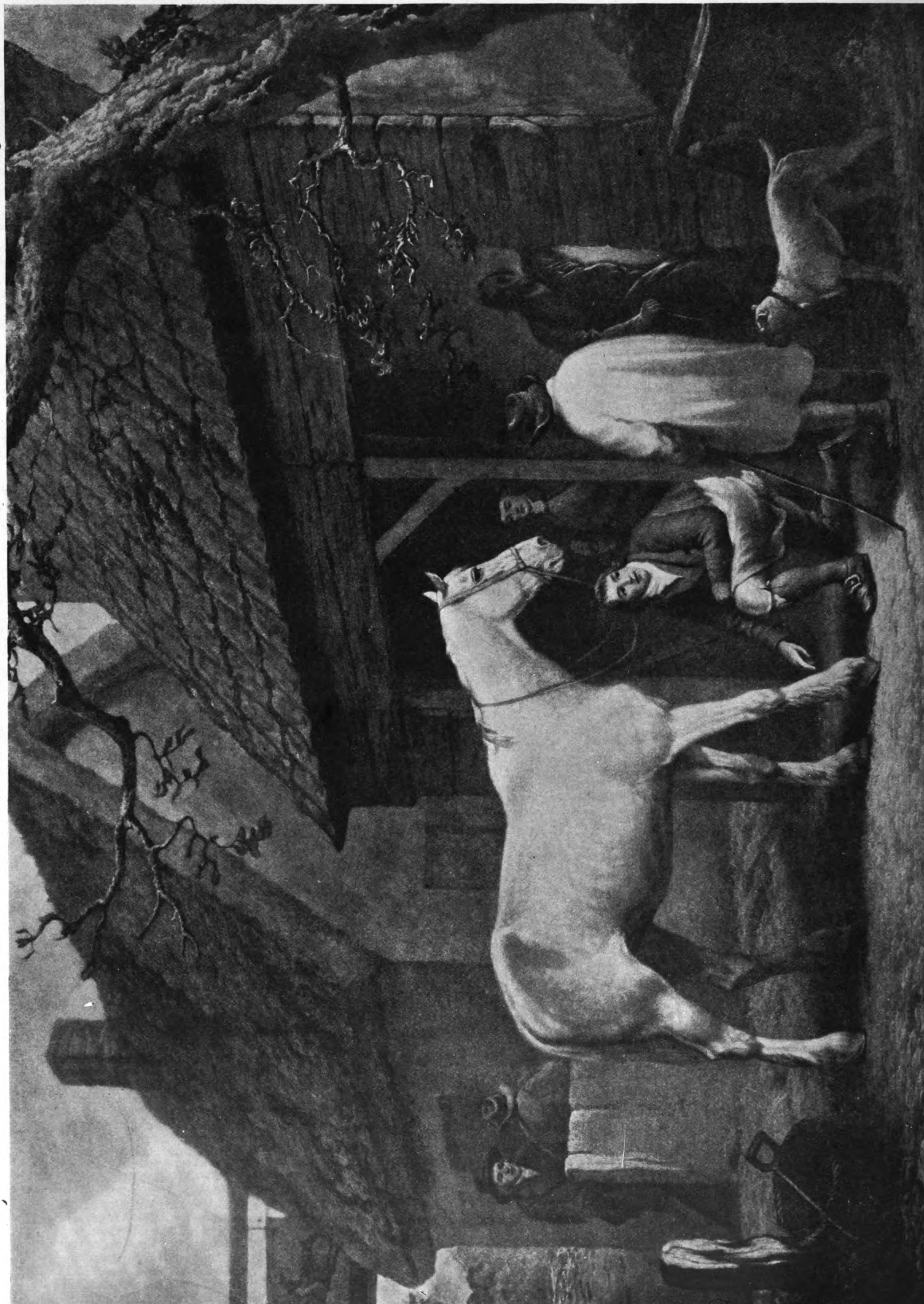
To The Strangers

This January number will go to quite a few blacksmiths who have never before seen a copy of THE AMERICAN BLACKSMITH, and it is, therefore, very much in order for us to say something about "Our Journal." Every issue of this paper contains the same number of reading pages as this one does. In each issue you will find the same standard of practical reading matter upheld. No trade puffs, stale clippings or matter of similar low standard is allowed in these pages. Our writers and regular contributors are authorities in their respective fields. They are giving our subscribers the value of their experiences every month, are giving them hints, kinks and instructions on work that it has taken them years to learn at first hand. As Mr. Cattanach of Oregon has just written; "I enjoy the journal very much and have been at the good old trade about fifty years and still can learn out of your journal."

THE AMERICAN BLACKSMITH brings the craftsmen into closer touch with a better knowledge of craft matters. It acts as an introducer to larger success and bigger opportunities; it solves the smith's daily problems, it gives him the practical money-bringing information that can be applied today on today's job. It gives you once a month, twelve times a year, not less than twenty-six pages of good, solid, practical craft information; not the social news nor the political news, but practical, usable craft news that can be applied on money-saving, profit-increasing problems in the smith shop.

Subscription Agents

If you don't know the man who solicits your subscription order, and he cannot show a letter authorizing him to act as our agent, don't pay him any money. Give him your order if you want to, but it is safer to send your money direct to Buffalo. Subscription agents acting for THE AMERICAN BLACKSMITH are usually supplied with a letter of authority to act as an agent. Ask to be shown that letter, if you don't know him, before you hand over your money. If he can't show you, send your money to Buffalo—and if you give us the name of the agent, we will give him credit—if he is an authorized agent. Observance of this rule will insure you against loss. We cannot, of course, be held responsible for money collected by agents who do not show their letters of authority. And there have been so many complaints of fake agents and solicitors that it is well for "Our Folks" to be careful and to investigate thoroughly the man who solicits a subscription order.

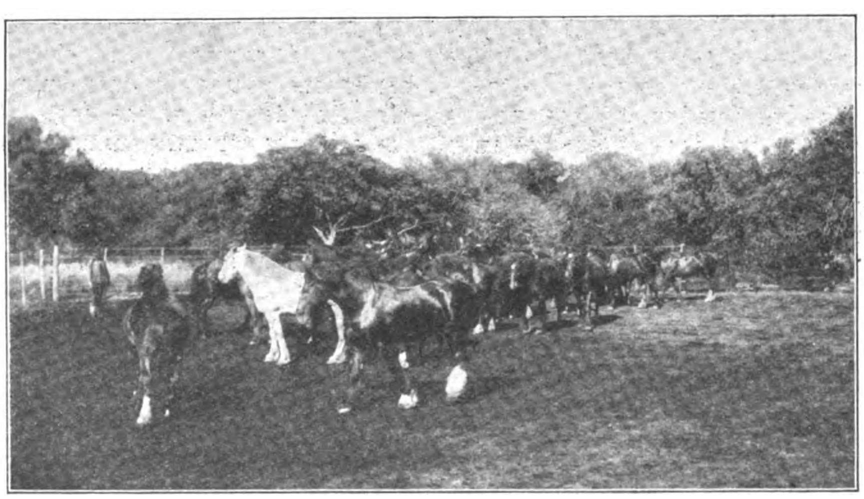


What Constitutes A Perfectly Balanced Foot

LESTER W. SIMS

THE wisest and shrewdest breeders, with almost unlimited means to collect the grandest types of broodmares and to mate them with the choicest and most select sires the world affords, have by no means been able to produce the standard of perfection from any point of view. But I refer especially to the anatomy of the foot and leg, and that little or big anatomical defect which lends to each horse his own distinct individual gait or peculiar way of going, which invariably spells imperfection and in the different horses varies to great extent, from well nigh perfection to many degrees of deformity. Hence, the gait or action of each horse is always in keeping with the anatomy. Therefore, the gait and action varies from perfection just so far as does the anatomy itself. All this being true, the proper time and place to remedy this defect is to begin with the beginning—the colt. Here I wish to impress forcibly on the minds of all who are interested in the welfare and future usefulness of the horse that a very important and critical period of existence is during colthood, especially when we realize what may be accomplished. Like care and attention to a young plant or tree, if taken at an early and tender age although very crooked, it may be grown most straight, and if properly cared for the results are sure and certain to be very remarkable and of importance. Recalling the fact that the gait or action will be in keeping with any defect or imperfection of the anatomy, naturally the question arises at this point, what is to be done? I say get a balanced foot, which is accomplished by dressing the feet at regular intervals and, if necessary, the use of a shoe properly designed will prove beneficial. A balanced foot means so much, yet is understood so seldom. And no one can hope to be a successful horseshoer until he thoroughly understands it, as it is the first rudiment of horseshoeing. A balanced foot is an even rotation of the column of bones from the ground bearing surface up. For example, take a straight stick to represent the entire fore leg and foot—saw one end off square and stand that end on a perfectly level surface. You find that the stick stands straight up or perpendicular. Remember now it is like the horse's leg and attached and stationary at the shoulder. Then saw it with some degree of angle as if to lower a horse at the heels. Now move it out at the bottom, seeking a level bearing you find it to point straight out in front. If low at the heels and inside it will point front and out. Now reverse it as though the heels were too high and it points back. If high on either side it points always to the high point, and in my opinion explains why we see so many horses with sound foot and leg never lame, but when at rest are pointing with one or more feet. This problem carries its own proof, that pointing is due to an unbalanced foot, and you may examine as many as you like and you will observe this fact.

Now suppose the leg resembles a common hinge with its action and tendons fore and aft; the tendons on the back of the leg causing that part of the action as flexing or folding, and the tendons on the front of the leg causing that action of extension. It is therefore readily understood that a long or high toe with low heels, and vice versa, is an unbalanced foot in this direction. That means undue strain on the tendons that is sure to work some serious injury in time. Again, with reference to the foot being too high or low on the sides, the ankle joint is a good indicator, dropping out of what should be a straight line up or an even rotation of the column of bones from the ground surface up, the ankle



BEGIN WITH THE COLT, AND THE HORSE, WITH A FAIR CHANCE, WILL TAKE CARE OF HIMSELF·

dropping toward and indicating the low side of the foot. So many hold the idea that the proper thing is to ascertain like measurements of the two sides of the foot from the coronet to the bearing surface. This, of course, is all wrong. The true object is to dress a foot up where it causes the column of bones to fall from a straight line, using the foot proper as a basis and by building up and lowering at the necessary points to bring about the conditions described. I have many times been asked when I dress a foot high or low at certain points if it does not cause a strain. I say "no, it simply relieves strain."

Some of the evils of an unbalanced foot are the development of splints, spavins, curbs, sprained tendons, etc. In some cases the cause is compression of the bones at certain points; in others, undue strain on the ligaments and tendons, and before the veterinary can hope for much success in treating such cases it will be necessary to remove the cause and obtain a balanced foot.

The Horse's Foot and Leg

A Dissection of the Animal's Front and Hind Limbs

E. W. P.

The great need of a more intimate knowledge of this important branch of the art of horseshoeing is emphasized in the large number of horses you may see today with the hoofs fitted to the shoes instead of the shoes being fitted to the hoof. After all that has been written upon the subject there are thousands of smiths shoeing horses today who have no knowledge of the living organism enveloped by the hoof on which they work every day.

The preparation of the horse's hoof for the shoe is an operation which requires an intimate knowledge of the foot and its relation to the limb of which it is the base. Where to cut and where not to cut; why the hoof of this horse should be high at the heels, while another should be low; how to level a hoof, etc., are problems which cannot be understood without a study of anatomy.

A dissection of a right fore-leg from the elbow to the foot is shown at Fig. 1. In this specimen the skin, connective tissue and hoof have been removed so as to show the muscles of the arm and the tendons and ligaments of the foot. In describing this specimen I want to call your attention to the foot in particular. You will observe that it is the exact counterpart in shape of the hoof into which it accurately fits. Seeing that this horny box—the hoof—envelopes one of the most complicated organs of the whole body, the intimate relation of hoof and feet become more apparent, and the knowledge of anatomy and physiology is appreciated as indispensable to scientific shoeing.

defective hoofs resulting from wire cuts on the coronet has been very large.

The sensitive laminae is a membrane highly charged with blood-vessels which extends from the coronet to the plantar surface in a large number—500 to 600—folds or leaves. Each leaf dove-tails into corresponding horny leaves of the insensitive laminae within the wall of the hoof. The sensitive laminae covers the entire os-pedis or coffin bone, and is the only membrane between it and the hoof. At the heels it turns under the plantar surface, following the course of the bars. It is plentifully supplied with nerves and blood vessels, and its function is to secrete the inner layer of soft horn and share in sustaining the weight of the animal.

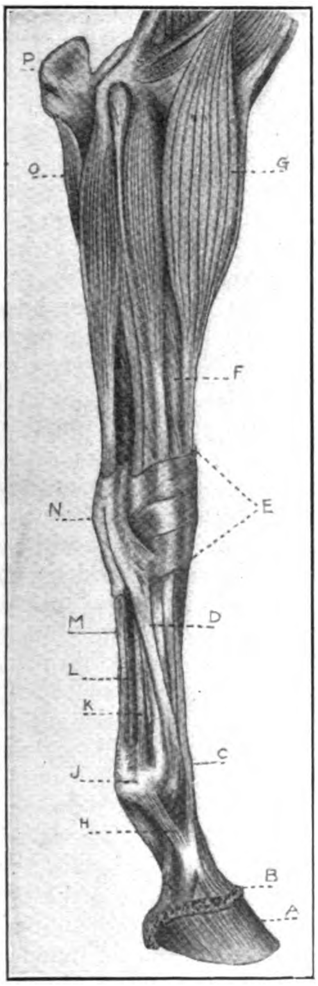
THE GAIT OR ACTION IS ALWAYS IN KEEPING WITH THE ANATOMY

The sensitive laminae is shown at A, while B is the coronary cushion and really a continuation of the true skin of the leg. The coronary cushions run around the foot at the coronet, lying in the depression at the top of the wall of the hoof. Its surface is covered with hair-like projections which fit into minute tubes in the wall of the hoof. At the heels the coronary cushion turns in and forward to form the bulbs of the sensitive frog. The function of the coronary cushion is to secrete the wall of the hoof, hence, whenever there is an injury to the coronary cushion there is a corresponding flaw in the wall of the hoof. Occasionally, owing to a severe injury, a portion of this cushion is lost, in which case the wall grown by it will be absent and only the inner layer of soft horn will cover the sensitive laminae. Since the advent of barbwire as a field fence, the number of

Muscles are composed of red colored material, which under a magnifying glass is seen as innumerable threads or fibres, bound up into bundles of every conceivable shape, according to the particular work they perform. By contraction of this muscular fibre the various parts of the body are moved. A muscle is attached to a bone at one end in a fixed position called its "origin." It is usually attached at its other end to a tendon or ligament which is called its "insertion." In Figs. 1 and 2, C is the extensor pedis which takes its origin at the elbow. Just above the knee the muscle joins the tendon, descending the outside front

of the knee, following the course of the cannon bone Y and over the front of the phalanges, joining with the branches of the tendon superior sesamoidal at the os coronae W and is finally inserted in the highest point of the coffin bone at V, Fig. 2. Its function is to extend the foot. D is the lateral extensor tendon of the foot, and is joined to its muscle above the knee and is inserted into the phalanges of the foot. Its function is to give lateral movement to the foot. The tendon superior sesamoidal at K is commonly called the suspensory ligament. It is a powerful brace, takes its origin in the back of the knee and descends about two thirds the length of the cannon bone. At this point it divides, one branch being inserted into each sesamoid bone at the fetlock J, from where the branches H extend downward and forward, joining with the extensor pedis and are finally inserted in the sides of the short pastern. In Fig. 1 G, corresponding to the large muscle of the arm, it is the great extensor of the knee. F in the same figure is the lateral extensor of the knee. E is the wide, flat band which encircles the knee—it is called the annular ligament. P is the ulna or point of the elbow, the peculiar construction of which forms a fulcrum for the action of the muscles attached to it. M in both Figs. 1 and 2 is the tendon flexor perforatus, which has its origin in its muscle above the knee. It descends the back of the leg just beneath the skin to the fetlock, to which its borders are attached at the sesamoid bones. Here it forms an oval shaped tube through which the tendon flexor perforans passes on its way down to the foot. From the fetlock the perforatus descends the back of the pastern for about four inches, at which point it divides into two branches which extend downward and forward and are inserted sidewise on the lower border of the long pastern and the upper end of the short pastern, on which bones they act simultaneously, inflexing the pastern. L, Figs. 1 and 2, is the tendon flexor perforans which is joined to its muscle just above the knee and from whence it descends the back of the leg, lying close to the perforatus. About midway between the knee and the fetlock it is joined by the metacarpal or check ligament, T in Fig. 2. The upper end of this is inserted in the head of the cannon bone. The perforans passes down at the back of the fetlock through the tube formed by the connecting cartilage of the sesamoid bones and the perforatus tendon. From this point the perforatus forms a sheath for the passage of the perforans to the point of its (perforatus) division, R, Fig. 2. Here the perforans drops through and descends to the foot, passing over the navicular bone (not seen in these engravings) and is finally inserted in the crescent of the coffin bone. The function of this tendon, as its name implies, is to flex the foot.

It will be seen from a mechanical standpoint that when these flexor tendons (those at the back of the leg) are acted upon by their contracting muscles they act like ropes upon pulleys by lifting the limb. When



THE FRONT LIMB

A—Sensitive laminae.

B—Coronary cushion.

C—Extensor pedis.

D—Lateral extensor of foot.

E—The annular ligament.

F—Lateral extensor of knee.

G—Great extensor of knee.

H—Branehes of tendon K.

J—Attachment of tendon K.

K—Superior sesamoidal.

L—Flexor perforans.

M—Flexor perforatus.

N—Trapezium.

O—Extensor of phalanges.

P—Ulna or elbow.

R—Bifurcation of perforatus.

T—Metacarpal ligament.

U—Coffin bone.

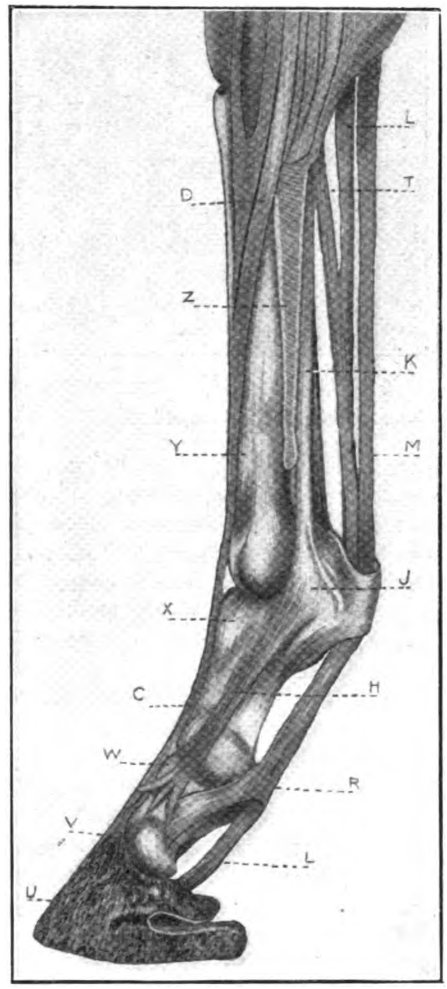
V—Insertion of C.

W—Short pastern.

X—Long pastern.

Y—Large cannon bone.

Z—Splint bone.



THE HIND FOOT AND LEG

the extensor tendons (those on the front of the leg) are acted upon by the contraction of their muscles they extend the limb. Each joint works upon its well lubricated surface in obedience to the action of its tendons and ligaments. The brain conveys its will through the motor nerves to the voluntary muscles, which contract and relax in obedience. Thus a marvelous animal economy performs the movements of the body. What a wonder that so complicated a structure keeps in repair so long, even under the disadvantages of improper shoeing. The foot being the base and the foundation of the limb above it, imperfect shoeing may and does affect not only the foot, but the whole limb. Hence the importance of this subject can scarcely be overestimated.

A CORNER OF THE MICHIGAN SHOP, RUN BY MR. JOE BOYER

Shoeing The Horse Correctly—5

J. C. Weaver

Selection of the Shoe

The selection of the shoe for a certain horse is not at all difficult after considering his weight, nature of his work, shape of the hoofs and the quality of the horn. Inasmuch as the hoof is continually growing and as it carries the shoe forward with it and as the quarters gradually become lower by rubbing and wearing away upon the back of the shoe it is generally considered best practice to choose a shoe that is somewhat longer than the hoof. In fact, the length of the shoe is considered of considerable importance in the proper and correct shoeing of a horse. For example, horses used on a run or on fast work usually require a short shoe. Those animals, however, which are employed for slow, heavy draft are usually supplied with a shoe that is fitted with both heel and toe calks and which extend backward far enough to support the bulb of the heel.

The weight of the shoe is, of course, dependent upon the demand of the animal's work, the condition of his limbs and the nature of the ground upon which he is compelled to do his work. Hard roads and a heavy, slow gait require strong durable shoes, which under the usual conditions are to be rendered still more durable by the welding in of steel. Medium weight animals used for moderate service upon soft dirt roads can usually be supplied with quite a light shoe, but not as light as running horses, which are usually supplied with very thin, narrow shoes of steel.

Very naturally, of course, the many different forms of hoofs require many different forms of shoes, and in the following the writer has attempted to explain the special peculiarities of each of the principal classes of shoes:

The hoof of regular shape requires, of course, a shoe conforming to it as nearly as possible. The shoe should be beveled on the ground edge all around, the nailholes being regular in direction and as evenly distributed as possible. The shoe should be slightly longer than the hoof; about the thickness of the shoe will be found sufficient in ordinary cases.

The shoe for a stumpy hoof should be perpendicular at the toe; however, if the hoof is very steep, it should be base-wide at the toe, that is beveled downward and outward. The nailholes should be placed to just beyond the middle of the shoe, the shoe being rather short than long and at most not more than an eighth of an inch longer than the hoof.

The shoe for an acute-angled hoof or in other words the hoof with an angle less than normal should be strongly base-narrow around the toe, but becoming gradually perpendicular toward the ends of the branches. The nailholes should be regular and the length of the shoes should be somewhat longer than the shoe for the regular hoof formation.

The shoe for a base-wide hoof should have the outer branch leveled downward and inward, while the inner branch is perpendicular. The nailholes on the outer branch should extend well back, while upon the inner branch they are crowded forward toward the toe. The length will depend upon the angle of the hoof.

The shoe for a base-narrow hoof should have the outer branch either perpendicular or base-wide, while the inner branch should be strongly base-narrow. Nailholes in the outer branch should be crowded up toward the toe, and under certain conditions punched deeper than the wall is thick, on account of the great width of this branch. The inner branch of the nailholes is to be distributed back to the quarter and punched light. The length of this shoe will depend upon the angle of the hoof. The outer branch of the shoe for the base-narrow hoof should be about an eighth of an inch longer than the inner branch.

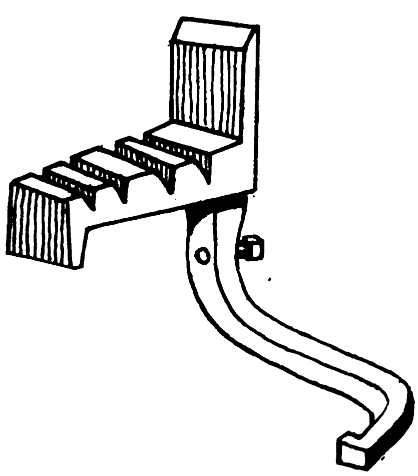
The shoe for a wide hoof should be somewhat wider webbed than ordinarily. The outer edge should be beveled under the foot all around. The nailholes should be carried back well into the rear half of the shoe, while the length of the shoe will depend upon the angle of the hoof.

The shoe for a narrow hoof should be moderately beveled on the outer edge under the hoof at the toe and on the inner edge should be perpendicular. The nailholes should be regular in distribution and the direction of the nailholes should be perpendicular and toward the quarter inclining somewhat outward, the holes about the toe inclining somewhat inward. The length of the shoe will depend upon the angle of the

hoof. Concaving is unnecessary in this instance.

In this connection it might be well to repeat a rule which has come down to us from a very eminent authority. This rule is: "The shoe should always have the form of the hoof, so long as the form of the hoof remains unchanged. For hoofs that have already undergone changes of form we must try to give the shoe that form which the hoof had before it underwent change." The treatment spoken of in this rule will not only do the hoof no harm, but on the contrary is of great advantage to it, as it is well known that in time the hoof will acquire the form of the shoe.

In this connection it might be well to mention a few matters which experience has taught us to be the best practice. After choosing the shoe which your own common sense has told you will be best suited for the case in hand, put the hoof into the best possible shape and then see that the shoe conforms as nearly as may be to the shape of the hoof. See that when the shoe is tried or fitted to the hoof that its bearing surface will fit air-tight to the bearing surface of the hoof. Remedy all defects in the surfaces of the hoof and shoe and see that the nailholes are correctly



A HANDY ANVIL TOOL FOR THE SHOER

punched and that the clips are drawn up properly,—that the shoe fits perfectly every way. Do not attempt to nail the shoe to the hoof before you have ascertained this to your entire satisfaction. In this connection it is well to bear in mind that uneven heating of the shoe in shaping it will cause it to twist and become distorted and out of shape. Every shoe should be straight, and when held before the eye one branch should be gradually in line with the other. A flat shoe when laid upon a level surface should touch at all points of its ground surface. The only exception to this is the shoe with a rolled toe, in which the shoe is turned upward at the toe. This rolled toe is given to the shoe because it conforms with the natural wear of the front hoofs and facilitates the breaking over of the feet, thus insuring a uniform wear of the shoe.

The shoe usually known as trough-shaped or bowl-shaped, that is a shoe with the inner edge lower than the outer edge, is faulty, disturbs the stability of the foot and shifts the weight of the body too much upon the quarter. This shoe should never be allowed to touch the animal's foot unless under exceptional conditions or when the condition of the hoof warrants a shoe of this character.

Nailholes should, under all circumstances and conditions, cover the white line. From the last nailhole back to the end of the branches for hoofs of the regular standing position of the limb the shoe should gradually widen until it projects at each quarter from a twenty-fifth to a twelfth of an inch beyond the edge of the wall. This does not, however, apply in the case of hind shoes. The inner branch in this instance should with few exceptions closely follow the border of the wall. This is for the purpose of preventing the interfering or tearing off of the shoe by the opposite foot.

(To be continued.)

A Handy Anvil Tool For The Horseshoer

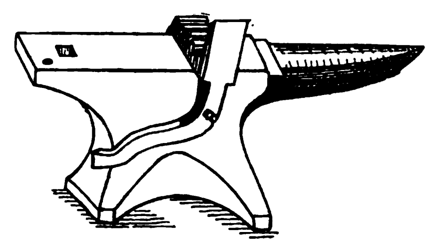
W. F. Hilsabeck

Take a piece of Norway stock, one inch by two inches for the block, leaving it long enough to make a part of the shank and the lip and turn the shank down. Next take a piece of tool steel long enough for the hardy and to make the face of the tool and weld onto the piece of Norway iron. Now turn the hardy up and then take a cleaver and cut the notches. Now take the different sized toes and drive them into the notches with a flatter. Now fit the tool to the anvil and turn the lip down and you have it ready for work. It is easily taken off and put on, the set screw holding it in place. In turning heel calks cut just enough off to make a chamfer, and when you turn calk it is sharp with but very little hammering.

The Horseshoer

Roger R. Jones, R. S. S.

To my mind no man is worthy of the name of horseshoer who is ignorant concerning the living structures he works upon. Shoeing the horse's foot is an operation which requires both anatomical knowledge and skill to perform, and the farrier who is possessed of such knowledge not only mitigates the sufferings of our noble



HOW THE TOOL IS ATTACHED TO THE ANVIL

friend, the horse, by avoiding many of the evils that cause suffering, but he is able to perform his task with greater ease and in many cases use considerably less iron than is used by the man practicing without science. A knowledge of the anatomy of the horse's foot helps the shoer to maintain the foot near to nature's lines. He does not mutilate the foot by way of rasping or paring. He knows perfectly well that by so doing he would be paving the way for brittle feet, contracted hoofs, cankered frogs, side bones, corns, etc., etc. He is alive to the fact that the foot must be supplied liberally with fresh arterial blood, and he provides ways and means to help to promote the circulation of the blood by allowing the frog to perform one of its most important functions. He knows also that nature has provided that the horse's foot should be easily carried (the bones within the foot being very light in proportion to their size). There is only a very small quantity of flesh composing the sensitive foot, the horny covering itself is light and there are no muscles below the knees in the front legs or below the hocks in the hind legs. He manufactures a shoe which is light to carry, but hard to wear out, because the iron is properly distributed. There are many points that the man who practices with science holds constantly in mind. The first step

in the process of shoeing the horse, that is, when he lifts up the foot to remove the old or worn shoe, at once sets his vigilance in motion. He is careful that the clenches of the nails are cut off properly and performed in such a manner that the horn of the hoof receives no damage. Secondly, he is careful where he places the pincers to loosen the shoe which, although the clenches have been removed, is still retained tightly on the foot. It is rarely that the animal ever flinches through having the delicate network of blood vessels ruptured by the man who knows the right and proper way to take off the shoe. He avoids the part known as the seat of corns and he grips the shoe above the part of the sole that is best able to bear the strain, viz., at the quarters of the foot.

With apologies to Farm Implement News

THE NEW YEAR'S DINNER

The Turkey was fine, the Gravy good, but the Pie Crust isn't short enough

Repairing and Handling Flues in the Railroad Shop

J. Geo. Jordan

It is very hard to add anything new to the art of flue welding, and handling same. I can only say how this class of work is done at our shop or at the different divisions on our system.

At Algiers, San Antonio and El Paso it is done under the direction of the boiler shop foreman. At our shop in Houston I have charge. It is not for me to say in what department this work should be done; however, the tools performing the different operations should be close together to save handling the flues a long distance.

At our plant we have a shed roof connected to the boiler shop under which all the flue work is done. The flue rattler is muffled to deaden its deafening noise. We put the flues with a few pieces of old angle iron, some old washers and nuts in the rattler to help clean them, and it takes about three hours to get them clean. From there they go to the cutting-off machine which has two rollers at the bottom and a roller knife at the top, similar to a tool for cutting off pipe.

The next operation is to scarf them. This is done in a revolving machine that has three cutters set in a head, and the taper that the flues are required to have is ground on them. When scarfed they are taken to the flue welder. The safe ends are scarfed on the same machine, the head is taken off and a tapered reamer is put in its place and the safe end is scarfed from the inside with the reamer.

The next operation is to weld them. We have an air hammer flue welder of our own make. It is simply two very large air hammers which the B. & B. Department had been using on bridge work. The hammers are put in a frame and the dies are so constructed that when the flue is down to size the dies will meet and cannot operate. The bottom die is stationery. The top die is held up against the hammer so that when the hammer is working it will clean the top die on the flue to be welded. All the operator need do is to turn the flue. This machine has a foot lever. You put your foot on the lever and the hammer will work. When welded take your foot off and take the flue out of the machine. We average 400 flues daily. We do this work by the hour and the flue welder has one helper. We use oil for fuel and the furnace is of our own make. The furnace has two holes for heating. The furnace will heat one flue per minute and that is what a man can weld. I believe in scarfing the flues, as you get a clean weld with no scale between your scarf. We use all steel safe ends on our flues as they weld about as good as iron and we very seldom have a leaky flue.

By Hugh Curril

In old boilers the tube ends sometimes become so rusted and corroded that they must be removed, the ends

cut off and new ones welded on. We have several labor-saving devices in use at our shops. In many shops it is customary to merely expand the ends, introduce the new piece and weld in that position without tapering the ends to fit each other. This method, owing to the sharp ends coming on the flat part of the tube, always leaves a slam around the tube which tends to weaken it, often producing fractures. We level off the outside of the safe end on an improvised machine. An old lathe does the same on the inside of the other part of the tube. The next operation is to weld the two together. We use a coal furnace and have a thick bar of iron on a stand at the back of the furnace which can be adjusted to take any length tube. We tap end against the bar, thus staving and welding both pieces together; then we put them on a mandrel and weld them under a McGrath air hammer. The tubes are then tested by forcing water in one end and air into the other end. If there are any fractures the water is forced out.

Repairing Springs in the Railroad Smith Shop

John Engels

In handling the repairs of springs we use as much of the old steel as possible. Where it is impossible to get the length we, of course, use new steel. If the springs are too low in set they are reset and tempered. If we find the set all right, and where there is not more than three or four plates broken, we put in new plates without resetting the spring.

In setting springs we let the first and second plate stand off $\frac{5}{16}$ to $\frac{1}{2}$ inch and give the plates a gradual taper to the top plate.

Draw out plates with an oval tool under the steam hammer. We also weld pads on some of our main plates, trim, finish and punch slot, when necessary, with the steam hammer while the steel is still hot. We also use a malleable clip on some of our main plates.

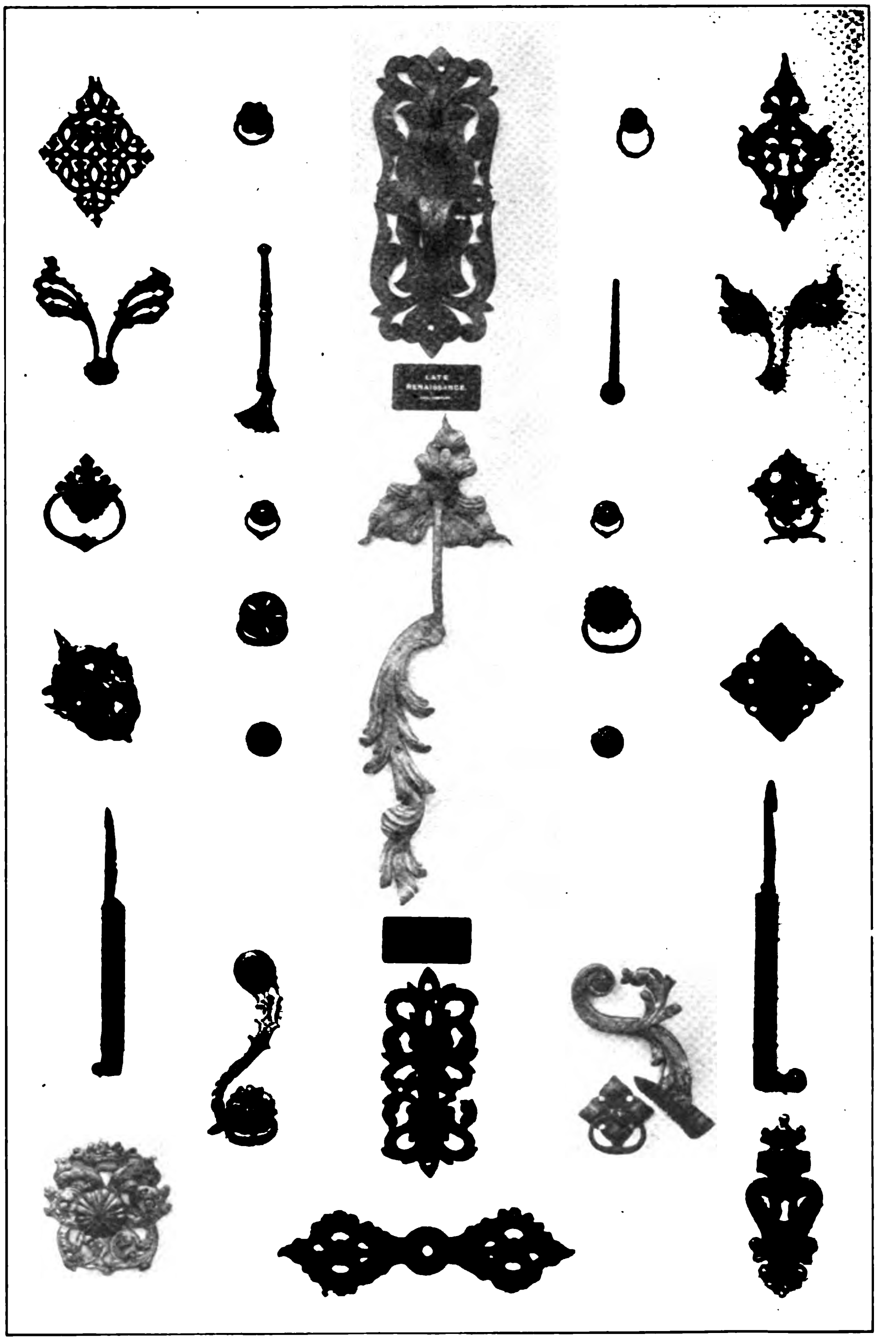
For a tempering bath we use a tank about six feet long and twenty-four inches wide, with a depth of eighteen inches. This tank holds two barrels of fish oil and is placed in a tank of water with about three inches of space on all sides including the bottom, to keep the oil as cool as possible.

Several years ago we tried sending our springs back to the manufacturer for repairs and found that this not only necessitated carrying a large stock of springs, but was far more costly than repairing them in our own blacksmith shop. We found for example that when an engine came into the shop for general repairs and had springs with only one or two plates broken that the expense in shipping such springs back to the manufacturer was costly and the delay great, and that such a spring could easily be repaired in the blacksmith shop with a couple of hours' work. In addition to this the springs can be had just when you need them and you are able to replace the same spring under the same engine without changing hangers.

Experiments In Casehardening

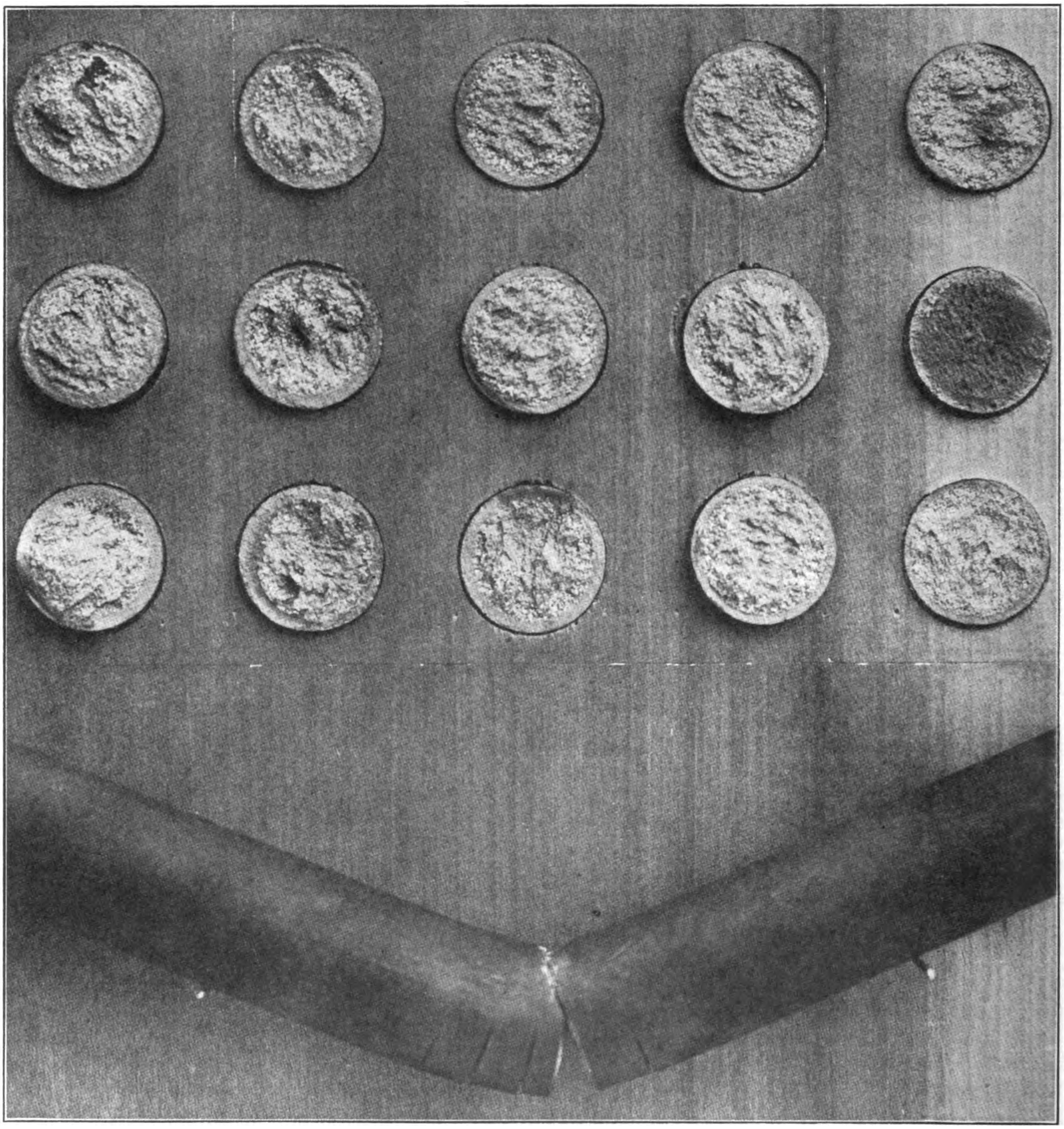
J. F. Sallows

While it is all right to try and better our product along whatever line we are engaged in, it is a useless as well as an expensive practice to try out all dope handed out to us



SOME HINGES AND DOOR KNOBS FORGED BY SEVENTEENTH CENTURY SMITHS

along the line of casehardening material. Every agent has something a little better than the other fellow. The writer was recently offered $100 for a writeup on a casehardening material, but when the agent was asked for a sample drum of material to try out for results the drum never came. The sample pieces of steel which the agent carried showed a very nice case which he claimed were done in an unreasonable length of time and were found to have been done with the same materials the writer has been using for the last three and one half years. These same samples were picked up by this agent while trying to unload a shipment of his materials in a large plant in Detroit, Michigan. When agents will stoop to such methods as those we should use a great deal of care in choosing new dope for casehardening. Just imagine for a moment a large furnace full of costly machined parts packed in a carbonizing material that will not act any better than a fair job of cyaniding. The parts are delivered to the grinding department and after a slight grind are found to be soft and, on breaking one of the parts, the case is found to be less than $\frac{1}{64}$ inch deep. The whole batch of parts has to be thrown in the scrap, and means a great many dollars to the firm.



CASEHARDENING IS LIKE OTHER FINE ARTS—IF YOU ARE CAREFUL AND TRY INTELLIGENTLY YOU CAN GET RESULTS

The writer has used nearly every kind of carbonizing material that has been passed around and tried them out conscientiously, and will give the readers of this journal the benefit of his labor and experience.

When some years ago I first started casehardening in a large way I tried wood charcoal and raw bone. This was a very dirty, dusty method, and sometimes we would get fairly good results, then again things would be all to the bad and we would blame the steel or the furnace or the bath. We never thought for a moment to blame the raw bone, which proved on investigation to be nothing better than oyster-shells and all kinds of old bleached bones ground up and put on the market for casehardening purposes. Ever since that time I have steered clear of raw bone. Remember it is hard to beat raw bone, if we can get the genuine article, but we cannot take any chances on getting stung. Then we tried anything and everything that came along and were having our troubles. Finally, when we were about to give up in despair, a drum of casehardening materials came in, with a letter from the "front office," to try out carefully. We did so, and have been using the same make of materials ever since. We never have a bad batch of work, the stuff runs uniform and is always new and fresh.

Now a great many people in the hardening line waste the material; that is, they throw away the residue altogether too soon, as I am about to prove. Of course, this is all the better for the people who sell the materials, but it is a bill of expense to the firm doing the hardening.

The large engraving, Fig. 1, shows what can be done along the line of economy. Here we show fifteen separate pieces of ⅞-inch round open-hearth steel. All have a real nice case and depth enough for the best class of work. There is plenty for the grinder to take off and still leave a large portion to resist wear for years. Now the way we do is this; after our work has been in the carbonizing furnace the required length of time at 1700 degrees F. we remove boxes and let cool. Then we reheat at 1450 degrees F. or 1500 degrees F., as the case may be; some parts, of course, requiring different treatment. For a great deal of work we let parts cool down in boxes to about 1500 degrees, and dump direct. But when contents are cold in boxes we remove whatever white-ash has accummulated on top, and screen balance back into mixing bin and add about one third new to this and mix thoroughly. And we keep this method up continuously the year around. We never throw any but the ash away. But on the other hand, if you set out boxes from furnace and don't keep covers on and allow the carbonizer to get wet there will be more waste to it. Some people don't even put covers on the boxes while in the carbonizing furnace, and yet they wonder why they cannot get results.

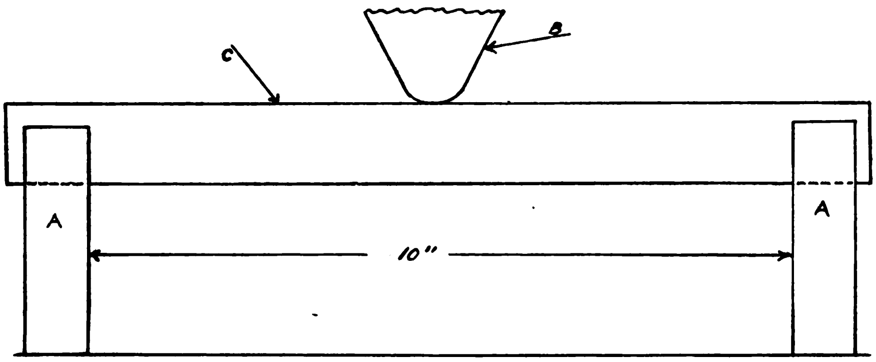


FIG. 2—THE POSITION OF THE PIECE IN THE TESTING MACHINE MAKES A DIFFERENCE IN THE APPEARANCE OF THE BREAK

Casehardening is like other fine arts, if you are a little careful and try to get results you can, and at the same time you save your employers a heap of money at the end of the year that will more than pay a good hardener's salary.

But to return to the fifteen pieces in Fig. 1. There is not a great deal of difference in them except the piece in the lower right-hand corner. This has a one-thirty-second inch case, and was only in the carbonizing furnace four hours at 1700 degrees F. I have failed to find anything so far to equal this feat, and I have as before said, tried nearly everything in sight. The piece in the lower left-hand corner was in eight hours. The balance of the pieces were in from six to nine hours. And all were done in mixed material; material, remember, that plenty of hardeners are dumping outdoors every day in the week, causing their employers to spend thousands of dollars that might go toward paying the hardening department employees more money if they could show where they were saving the firm dollars in getting results by using the proper kind of materials and a little horse sense in the operation. The piece in the middle row at right-hand end shows a real nice core as compared to some of the others. I will explain how this result was brought about, to a great extent. The core in the bent piece at extreme bottom of picture is the same as the one in the middle row at the right. If you take a round bar and, after it has been carbonized and hardened, arrange it as shown at Fig. 2 with V-blocks, AA, about ten inches apart and pressure block, B, in center of round bar, C, the bar will gradually bend before breaking and look about as bar shown at bottom of photo in Fig. 1. And in a great many instances the core will appear as shown in round piece in middle row at right-hand in Fig. 1. Then, again, if we arrange

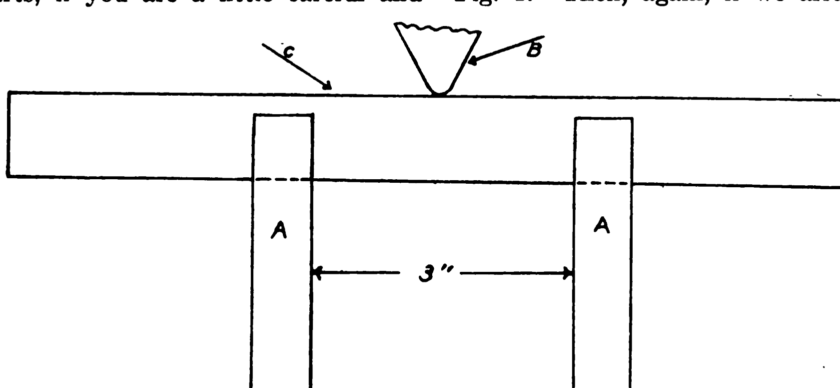


FIG. 3—THE PIECE WILL EITHER SNAP QUICKLY OR BEND SLOWLY BEFORE BREAKING, DEPENDING UPON THE POSITION OF THE SUPPORTS

them as shown in Fig. 3 with V-blocks AA, about three inches apart and pressure block, B, in center of round bar, C, the bar will have a tendency to snap off and will show a core like the balance of the pieces shown in Fig. 1.

Now we call your attention to the all important point of the carbon content of the different kinds of materials used. A great many hardeners do not consider this part of the game at all, but it is the most important point of all. For instance; if the materials used will not furnish a carbon content of 90 point or better they are very dangerous to use. Of course, for gears and some other parts a little lower than 90 point will answer. But for ball-race work and all work that has to be glass hard after grinding we should have from 90 to 100-point carbon. I have been asked a great many times how to find out the amount of carbon a carbonizing material will furnish in steel, and I will now make that plain. Take a piece of round open-hearth steel, say ⅞ inch or 1 inch round and 7 or 8 inches long. Pack this in your carbonizer and leave in furnace long enough to get about ⅛ inch of case. Then set out and let cool. When cold have the steel sandblasted or bluffed anyway to clean nicely and then have it centered correctly as shown at A, Fig. 4, and not as shown at B. If centered, as in B, the case will be turned through on side and hardly any taken off of the other side. Well, after centering bar correctly have a slight cut taken the entire length of bar, not deep enough to go through case, and take the turnings to the laboratory for proper analysis. Where there is no laboratory in connection with plant then the turnings will have to be sent to an outside party for the purpose. And to determine whether you have gone through the case or not, heat bar after turnings have been removed to 1500 degrees F. and quench in cold water to see if it will harden, if it does you are safe.

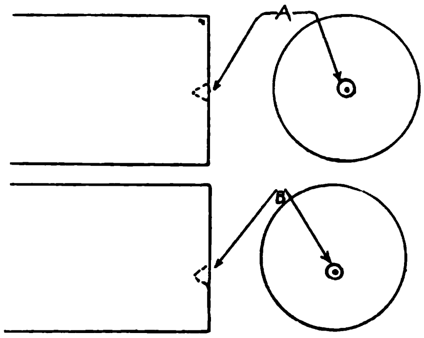


FIG. 4—A TEST BAR MUST BE CENTERED CORRECTLY

Then, again, there are some materials that are very high in sulphur, and these are, of course, very dangerous to use. The engraving, Fig. 5, shows a piece that was carbonized in a line of material that was high in sulphur, and the steel as shown is little better than castiron. Then we packed the piece shown in Fig. 6 in the residue left from carbonizing Fig. 5. This, you see, is a little finer in grain. We account for it in this way; the sulphur was used up to a great extent in the first operation; perhaps if the residue was used the third or fourth time we might have obtained fairly good results. The piece of steel shown in Fig. 7 was carbonized in Blaich Modern Carbonizer and shows a fine case something like the grain found in high-speed steel. We hear of some people having a material that will give a case ⅛ inch deep in two or three hours' time at a low temperature, but they are bluffing. Anyone in the business knows that the contents of a box will not reach a carbonizing point until in the furnace for at least three hours, no matter how hot the furnace is when the box was placed in.

In conclusion I will say if you are getting good results at a small expense stick to it like you would to an old friend, until you are sure of getting a better one.

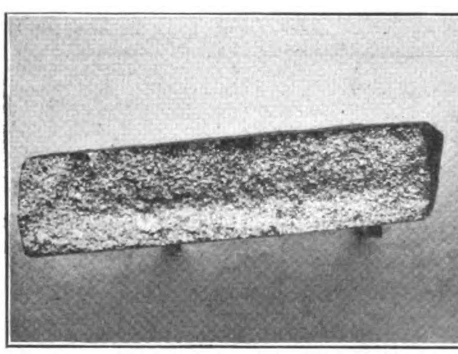


FIG. 5—THE RESULT OF USING A HIGHLY SULPHUROUS MATERIAL

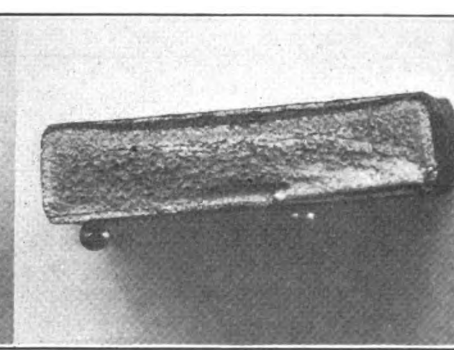


FIG. 6—THE RESULT OF USING THE MATERIAL THE SECOND TIME

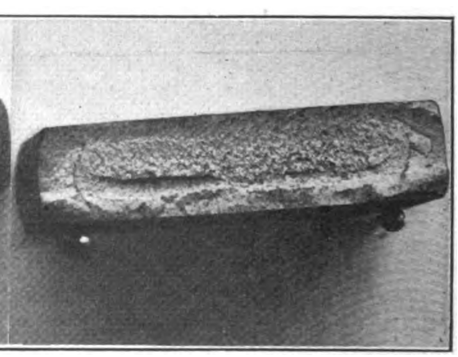
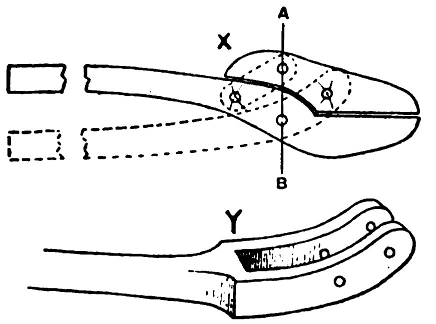


FIG. 7—THE RESULT OBTAINED WITH ANOTHER BRAND OF CARBONIZER

How To Do Babbitting Properly

W. J. McKimmey

The first thing to do, if your box has been babbitted before, is to cut out your old babbitt and have the box thoroughly clean and dry. The next step is to set your shaft up in the lathe and turn the bearing until it turns down to exactly round. The last shaving should be taken very thin with a very sharp finishing tool, so that the bearing will be as smooth as it is possible to make. If the box is a solid box I usually turn the bearing slightly taper. Now place the shaft in position and with a gasoline torch warm the shaft to a moderate heat, stopping the ends of the box with anything that will hold hot babbitt. I generally use cardboard backed up with putty or clay and, after allowing an extra airhole, have your babbitt thoroughly melted, and pour as fast as it will run in. Now bore out your oilhole and pour some thin oil in and you will have no trouble in working off your box. The shaft being hot and slightly expanded when the babbitt sets will allow it to come out very easily, and by having the shaft warm will cause the metal to run against it without making blubbers and airholes. If the box is a solid bored box it should be put on the lathe and bored out large enough to allow the babbitt to have good thickness.



HOW TO MAKE PARALLEL TONGS

Now I don't think a perfect job of babbitting can be done without the use of the lathe, for whenever you find a worn boxing you will always find the shaft is worn flat on the sides also and must be re-turned.

An Emergency Pipe Tap

E. J. Mayer

Sometimes you are in very bad need of a pipe tap and have none on hand, so that it becomes necessary to do the next best thing,—make one.

I took a piece of square tool steel a little larger across the diagonal corners than the size of the blank tap. This I fullered on all four sides for two inches from one end, and then hammered the corners until they were the distance across that the blank tap should be and in the shape of a tap. Next I hammered the shank square and left it long enough to be gripped in the vise to be threaded. The blank was now annealed and it was then ready to be threaded. This is how I did the threading: I had a pair of pipe stock and dies, so I took a short pipe nipple and coupling with the same number of threads per inch that I wanted the tap to have. I took the guide out of the stock and put in its place the pipe coupling, bushing it so that it would be in the center of the opening. Then I started the nipple into this coupling and slipped the blank tap into the nipple until it came in contact with the die. Now put this into the vise, so that the nipple will come between the vise jaws and be gripped tightly to the blank tap and both held firmly in the vise. This nipple and coupling will act as a guide for the cutting of the threads. The tap is hardened and the temper drawn to a dark straw color.

If a pipe die is at hand with a leader screw, of course it would not be necessary to use the nipple and coupling, but just clamp the leader screw to the blank tap by means of the set screws. The threaded end of the tap was ground to a slight taper so that it would take hold of the work. This tap gave excellent results in cutting threads and also stood up well under the work.

How To Make Parallel Tongs

"Work"

When making these tongs the setting out of the centre of the rivets or points of fulcrum will depend entirely on what size the jaws of the tongs are made. The mode of procedure is as follows: Forge the jaws first, then place them together as shown at X. Strike a line at right angles with the jaws as at AB, and on this line mark with a punch the centre of each jaw. Set a pair of compasses to these marks, and then from each mark strike the radii as shown on each jaw. This gives the exact position of the four rivit holes. After drilling these four holes, replace the jaws in position, and then get the shape and length of the lever or bottom rein; also the connecting link as shown by the dotted lines. When made, drill the holes in them to correspond with the holes in the jaws. Care must be taken to have the holes in the lever and the link the same distance apart otherwise the jaws will not keep parallel when in use. The length of the reins, or handles, would be 2 feet. These tongs can also be made up entirely of flat-section parts; but if the lever is made with an open end, as shown at Y the tongs are far more rigid and firmer to work with.

"Well, Benton, what important find have you made now?" questioned the Editor, as the recipe-man came in rather excitedly.

"Oh, I've simply gotten hold of several recipes that you wanted," replied Benton, making himself comfortable in his favorite chair and pulling out his note-book. "You'll remember you wanted a new belt cement—one that will dry and set quickly. Well, I got it yesterday down at the Howe plant. Charlie Morris was at work on some belts when I happened in. He said he usually repairs or cements his belts in the afternoon or immediately after shutting down and the belts are then ready for use in the morning."

"What does he use and how is it applied?" questioned the Editor.

"Well, I watched him cement several belts and this is how he does it," began Benton. "He first shaves the ends of the belt so that when the ends are lapped the lapped part will be the same thickness as the belt proper. Of course, he makes the lap long enough to hold tightly. Then, if the belt was greasy, as a used belt usually is, he took several thicknesses of common wrapping paper and, after laying the paper on the belt end, he applied a heated iron. This melted the grease which was immediately absorbed by the paper. Of course, if it's handy, blotting paper is best. Charlie uses an old laundry iron that he has for just that purpose. After he has removed the grease, he applies his belt cement, presses the parts together and then clamps the belt between a couple of boards. He says the belt will then be ready for use in the morning. The cement is in the form of a paste and is made by mixing five ounces of bisulphite of carbon, one half ounce of spirits of turpentine with enough gutta percha to make a paste."

"How about that stunt for drilling glass?" then asked the Editor.

"Oh, I've got that, too," returned the man of recipes. "Make a solution by dissolving zinc in muriatic acid and adding an equal quantity of water. The drill for cutting glass is dipped into this solution when hardening it and used without teming."

"What was the other formula I wanted?" questioned the Editor, as Benton finished.

"You wanted something on the surface hardening of cast iron. I ran across two methods that I think will suit that reader to the very letter. As I understand it, he had several small cast-iron machine parts that he wanted to caseharden because they wore out in a very short time. This first method I think will give the better results of the two, though it is not as simple as the second method. First take equal parts by weight of saltpetre, sal-ammoniac and prussiate of potash. These ingredients should be pulverized and then thoroughly mixed. Now make a solution by adding four ounces of prussiate of potash and two ounces of sal-ammoniac to a gallon of cold water. After the powder and solution are ready, heat the pieces to a red, roll them ir the powder, covering all parts, and then dip into the liquid.

"The other method is somewhat simpler. Make a saturated solution of cyanide of potash and water and put into an iron pot near the heating fire, so that the solution will be kept very near to the boiling point. Now heat the parts to be hardened to a dull red and quench in the heated solution. This will toughen the surface of the cast iron, though I do not believe it is as good as the method I mentioned first."

"Well, Benton, you've dug up some real recipes this trip—better smoke a cigar and then we'll go out to lunch. I've just got time to look over these proof sheets before lunch-time," and Benton was not slow in accepting the Editor's invitation.

On the Threshold

W. O. B.

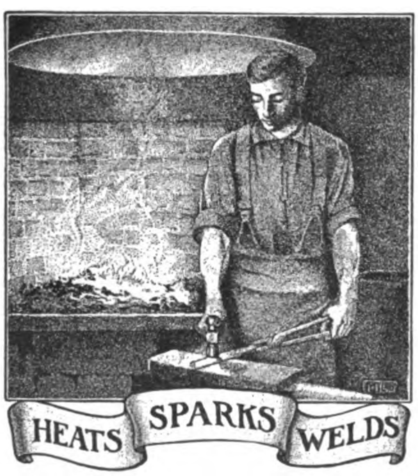
In the ol' days when Foster's general stoar an' Jim Fair's smithshop was 'bout the only buildin's comprisin' Sneetzes Crick, they used the ol' shop fer meetin' house an' church. The anvil made a good church bell on Sundays, an' Jim used ter preach sum pretty stiff sermons. Here's one o' Jim's ol'-fash'oned sermons thet was brought back t' mem'ry by the shoutin' o a 'vange-list et the Baptist Church t'other nite.

When yer waitin' on the threshold with yer hand upon the door,
When jes' a word er w'isper an' then you'll leave earth's floor—
Will tho'ts o' quiet comfort steal thro' yer brain et nite?
Er will yer head be troubled with deeds thet weren't rite?

When yer treadin' on a borderland y' never trod before,
Awaitin' fer the summons t' seek Saint Peter's door,
Will y' think o' deeds o' goodness, deeds o' helpfulness an' cheer?
Er will yer mind be crowded with thoughts thet cause a tear?

When yer near the new day's dawnin' en' nite's t' end et last,
When thoughts upon the future air tempered by the past,
Will y' hear sweet strains o' music gentle es the fallin' rain?
Er will yer ears be flooded with cries o' sin an' pain?

When y've left the field behind y', hev' scattered all yer seed,
When y've gathered in yer harvest an' air lookin' et the yield,
Will yer harvest be o' thistles or o' clover, smellin' sweet?
Fer y' know thet es ye soweth so shall ye also reap.



Exercise of brain is as necessary to healthy growth as exercise of body. Does "Our Journal" make you think?

'Tis not always best to make a change, but it shows you are alive—and sometimes that is very necessary.

When a man spends a dollar with you he has a right to know what he is getting for the dollar. Does he know every time?

Most businesses will stand a heap of prodding before they will balk. Now is a good time to prod your business.

It's time to get a better price. When the cost of supplies goes up and the price you get for work stands still, your profits are cut down. See that you insure your profits.

Careful attention will insure a smooth running gas engine these days and it will not be wasted. Cold weather always brings gas engine trouble with it.

If you know of a smith who is continually kicking about the trade going to the dogs, hand him a copy of THE AMERICAN BLACKSMITH and see his frowns change to smiles.

It is commendable, of course, to keep expenses down, but don't let the automobile of business go to ruin for want of a little grease or oil.

Don't make the mistake of handing your subscription order and remittance to every one that asks for it. Read "Timely Talks with Our Subscribers" this month. There's a reason.

The shaping of character in the man is far above the shaping of tough black iron, or the shaping of white wood. After all is said and done, this is really the purpose of life.

You cannot keep accounts to the lowest notch unless you know who owes what. A simple system of bookkeeping will enable you to know just where you stand and how your customers stand with you.

Don't be afraid to teach the youngsters all you know about the craft, for the apprentice of today is the craftsman of tomorrow. Induce the young men to take up the good old trade and insure the trade future.

Let the country 'round about know what you can do and how well you can do it. The best smith in the country you may be, but who will know it if you don't advertise the fact? And persistency along this line will win every time.

It's a case of keeping up with the leaders or dropping out altogether. The modern year demands modern methods. Gray-haired methods won't do for brown-haired people. Because your grandfather did it, is no reason for doing it the same way.

Don't wait for opportunity, go up the road to meet it. It means extra profit to you without one cent of outlay for rent, heat or other running expenses—and right now is a good time to install a side line or two.

It is said that there are two ways to succeed. One way is to work at the thing that interests you and the other is to take an interest in your work. But Tom Tardy is not interested in work of any kind—is it any wonder he isn't a success?

"**I have been compelled** to make another cut in shoeing prices," said Tom Tardy the other day, "although I am now doing business at a loss." It is our candid opinion that Tom knows more about cutting prices than he knows about cutting hoofs.

Some business men, and some are smiths we are sorry to say, seem to forget that the one and only reason for business is profit. And still others allow the sight of profit to blind them to their obligations and promises to customers.

Are you prepared to take care of them? They are advertised in the farm papers and farmers are buying them. When they break down and need fixing, the farmer will come to you. Are you prepared to take care of the automobile?

It's not only economy to buy the best in tools, but keep them right up to date with careful attention. And you can figure this out for yourself. It takes a lot of time to repair an old tool every time you want to use it. It means money in your pocket a good many times when you get a new one.

Here's a suggestion—send us a one-dollar bill and get a year's subscription to THE AMERICAN BLACKSMITH for a friend; one subscription for yourself and a new subscriber for us. Can you distribute more good New Year's cheer for so little money in any other way?

After asking Tom Tardy several questions on anatomy of the horse's foot, we attempted to make a chart of Tom's actual knowledge on the subject. Here's the result:

Let your prices be an indication of quality. Price and quality are both important factors in the getting and holding of customers. You cannot stay in business long if you cut the price and raise the quality, neither can you afford to raise the price and cut the quality.

It's the man with an experience of about three months who thinks he knows all about the craft. The men who have stood behind the anvil for thirty, forty or fifty years are just beginning to learn how limited their knowledge is—still studying and learning are the old veterans of the craft.

Two heads are always better than one. The mutual consideration of methods, the exchange of ideas, the voicing of suggestions and opinions—these things bring out the best that is in us as members of the craft. Let us one and all resolve to make more use of "Our Journal" as a medium for the exchange of ideas and opinions.

Shop mottoes, business slogans and other means calculated to fire ambition and solve the problem of success cannot help the man to a better hiold on life's necessity. Knowledge—good, solid, practical knowledge—on the man's chosen trade will make him a better man, a better worker, a bigger success.

The successful smith must be a business man as well as a mechanic. It's one thing to run a sewing machine, but quite another to sell it. The smith must know how to do his work right, know how to get customers, how to hold them and how to do business in a business way, and our smiths are doing it every day in the week.

Some men think it is good salesmanship to force a man to buy something they know he does not need or want. A true salesman is the chap who sells a man something because he knows the man needs it. He upholds the price and gets what his goods are worth. It's a sign of poor salesmanship to cut the price. When a smith cuts the price he admits that he is either a poor salesman or a poor workman.

Did you ever notice how positively we make statements about those things of which we know the least? When we know a subject thoroughly—when we can see its fine differences, can see how its various divisions and parts interweave, as the threads of a fabric intermix, then we know that subject too well to speak positively about it. But when we have heard a few broad statements, when we have heard perhaps just two or three barren facts, how easy to make positive statements with the utmost assurance of their value as apparent facts.

A chap usually described as nervy, thinking that blacksmithing looked easy and being out of work, decided to have a try at it. He applied at one of the general shops and asked for a job. "What experience have you had?" questioned the smith.

"Seven years," promptly replied Nervy Nat.

"Well, I'll try you, you're a strong, likely looking fellow—just shoe that horse while I go to dinner."

When the shoer got back he looked at the horse and then at his new man.

"Haven't you got her shoes off yet?"

The new man bit his lip, blushed and stammered, "I-I-I can't get her blamed foot in the vise."

Our Honor Roll

Do you realize that this list of readers who have paid in advance is the best possible argument we can present in support of the sound, practical and valuable nature of "Our Journal"? And the list is growing every month. For example, this January list contains just thirty-seven more names than did the December. And that's saying nothing about the thousands of others paid up to 1912, '13 and '14.

A glance at our long-time rates will show you how easy it is to get on Our Honor Roll. And most important is the saving in real money. That special ten-year rate will save you five whole, hard dollars of Uncle Sam's good coin.

	U. S. and Mexico	Canada	Other Countries.
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s

A paper with a list like this and with several thousands of other subscribers who have paid in advance to 1914, 1913 and 1912 must be valuable. Practical smiths don't pay for a paper in advance unless that paper is practical and worth real money. Ask your neighbor to subscribe—show him this list.

NAME	Subscription Paid to
I. J. Stites, New Jersey	Jan., 1923
W. Lawson, New Zealand	Nov., 1922
O. M. Johnson, Minnesota	Oct., 1921
H. Feldus, Nebraska	Sept., 1921
R. S. Crisler, Kentucky	Jan., 1920
T. P. Considine, Massachusetts	Dec., 1918
Richard Brenner, Texas	Feb., 1918
J. N. Bathgate, North Dakota	Nov., 1917
E. Thibaudeau, Wisconsin	April, 1917
J. N. Miles, Kentucky	April, 1917
J. M. Brown, Texas	April, 1917
J. S. Haskell, Colorado	Mar., 1917
W. L. Roark, Texas	Mar., 1917
A. Tillman, California	Feb., 1917
Walker Bros., New Zealand	Feb., 1917
Leonard Smith, New Jersey	Dec., 1916
C. F. Shaw, Manitoba	Dec., 1916
W. Elward, Pennsylvania	Dec., 1916
W. W. Egly, Pennsylvania	Dec., 1916
Jos. Boyer, Michigan	Dec., 1916
J. H. W. Schneider, California	Dec., 1916
W. Sauer, Minnesota	Dec., 1916
F. F. Darling, California	Dec., 1916
Chas. Newland, California	Dec., 1916
J. T. Brahm, Iowa	Dec., 1916
P. H. St. Louis, Wisconsin	Dec., 1916
A. E. Nickols, Oklahoma	Dec., 1916
C. J. Hall, Washington	Dec., 1916
G. Lindborg, Indiana	Nov., 1916
Pittman Stell, North Carolina	Nov., 1916
J. S. Finkenbiner, Indiana	Nov., 1916
R. D. Wixom, New York	Nov., 1916
E. A. Knapp, New Zealand	Oct., 1916
T. J. Haskins, New South Wales	Oct., 1916
Lothian & Skinner, N. S. Wales	Oct., 1916
W. B. Knouff, Alabama	Oct., 1916
Gorham Bros., Iowa	Oct., 1916
W. H. F. Brauch, North Carolina	Oct., 1916
Clark Olds & Co., Nebraska	Oct., 1916
Irwin Scott, New York	Oct., 1916
James Poettgen & Co., Missouri	Sept., 1916
Jno. Goetzinger, Iowa	Sept., 1916
Geo. Fleckenstein, California	Sept., 1916
Geo. Hill, Australia	Sept., 1916
E. C. Beard, Australia	Sept., 1916
J. K. Glinicki, Michigan	Sept., 1916
Oscar Buhner, Maryland	Sept., 1916
A. J. Hammond, California	Sept., 1916
Robert Murray, California	Sept., 1916
D. E. Wright, Pennsylvania	Sept., 1916
J. S. Haskell, Colorado	Sept., 1916
R. Sommer, Australia	Sept., 1916
J. A. Sequin, Canada	Aug., 1916
James Clarke, Jr., Australia	Aug., 1916
Dispatch Found'y Ltd., N. Z.	Aug., 1916
C. P. Robertson, South Africa	Aug., 1916
A. C. Lodwig, California	July, 1916
A. A. Bahlke, Michigan	July, 1916
J. K. Hansen, Australia	July, 1916
J. B. Barker, Illinois	July, 1916
H. M. Larsen, Wisconsin	July, 1916
Geo. P. MacIntyre, Maine	July, 1916
G. R. Harrison, Australia	June, 1916
J. Waycich, South Africa	June, 1916
W. Voight, South Africa	June, 1916
Martin Jensen, Wisconsin	June, 1916
Chester Humbert, Wisconsin	June, 1916
Lincoln Underhill, California	June, 1916
M. Broton, North Dakota	June, 1916
Hans Eriksen, Illinois	June, 1916
C. Morrell, New Brunswck	June, 1916
J. O. Conrad, Kansas	June, 1916
Adam Schmitt, Michigan	June, 1916
James Sinclair, West Australia	May, 1916
H. Baker, Australia	May, 1916
E. Q. Krehbiel, Kansas	May, 1916
C. H. Cairns, New York	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vermont	May, 1916
C. A. Stebbins, Kansas	May, 1916
Sanford Baker, Missouri	May, 1916
P. A. Peterson, Iowa	April, 1916
D. E. McDonald, Florida	April, 1916
James Baxter, South Africa	April, 1916
E. P. Dignan, South Australia	April, 1916
W. H. Winget, Vermont	April, 1916
A. Rockenschup & Son, Louisiana	Mar., 1916
C. H. Alexander, New York	Mar., 1916
A. M. Harebo, Wisconsin	Mar., 1916
George Howard, Kansas	Mar., 1916
G. N. Follmar, Nebraska	Mar., 1916
W. Willoughby, Michigan	Mar., 1916
H. Hoffmeyer, New Jersey	Mar., 1916
Frank L. Locke, New York	Mar., 1916
Frank L. Evarts, Connecticut	Mar., 1916
C. R. Winget, Vermont	Mar., 1916
Hugh & John Chisholm, N. Z.	Mar., 1916
C. F. Molkenten, Australia	Mar., 1916
H. D. Phillips, South Australia	Mar., 1916
F. J. Flessel, New York	Feb., 1916
E. P. Jones, Kansas	Feb., 1916
C. K. Cornelison, Pennsylvania	Feb., 1916
Charles Tucker, Michigan	Jan., 1916
M. Klitgord, New York	Jan., 1916
O. Stenning, South Dakota	Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts	Jan., 1916
Feldmeyer & Schaake, Kansas	Jan., 1916
Geo. Sykes, Australia	Dec., 1915
W. Patrick, New York	Dec., 1915
Jas. A. Sharp, Massachusetts	Dec., 1915
J. Krahulec, Illinois	Dec., 1915
P. E. Dahlfurst, California	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Nebraska	Dec., 1915
G. S. Fisher, Nebraska	Dec., 1915
Printers Supply Company, Nebraska	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Virginia	Dec., 1915
C. J. Ash, Kansas	Dec., 1915
F. H. Joslin, Massachusetts	Dec., 1915
C. W. Ames, Massachusetts	Dec., 1915
C. L. Sorensen, Nebraska	Dec., 1915
E. Williams, New York	Dec., 1915
W. Urquhart, New Zealand	Dec., 1915
W. Rupe, Oklahoma	Dec., 1915
L. S. Kocher, Iowa	Dec., 1915
P. W. Frazer, New Zealand	Dec., 1915
D. Codere, Illinois	Nov., 1915
F. S. Woody, Iowa	Nov., 1915
George H. Ilsley, Massachusetts	Nov., 1915
M. I. Huff, Missouri	Nov., 1915
Stephen Wachter, Pennsylvania	Nov., 1915
H. Dier, South Australia	Oct., 1915
S. B. Goodsell, Connecticut	Oct., 1915
D. F. Hallowell, Iowa	Oct., 1915
A. Roth, Illinois	Oct., 1915
C. C. Perry, Australia	Oct., 1915
Sidney Stevens Imp. Co., Utah	Oct., 1915
W. H. Findlay, New Zealand	Oct., 1915
R. F. Watson, California	Oct., 1915
H. R. Stone, Connecticut	Oct., 1915
F. Teuber, Georgia	Oct., 1915
Ed. Hammill, California	Sept., 1915
R. D. Simkins, Pennsylvania	Sept., 1915
T. J. Reynolds, Pennsylvania	Sept., 1915
Wm. Bates, Texas	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, West Virginia	Sept., 1915
Hugh L. Lynn, Kentucky	Sept., 1915
Advance Blacksmith Co., Mo.	Aug., 1915
A. Chargois, Queensland, Aus.	Aug., 1915
A. M. Byfield, West Australia	Aug., 1915
C. E. Allen, Nebraska	Aug., 1915
M. J. Roder, Montana	Aug., 1915
J. E. Lyon, Texas	Aug., 1915
F. W. Krenz, California	Aug., 1915
Jos. P. Rotolinski, Massachusetts	Aug., 1915
Jas. A. Buchner, Michigan	July, 1915
G. N. Ferree, Utah	July, 1915
T. O. Chittenden, New Zealand	July, 1915
The Goldfields Diamond Drilling Company, Australia	July, 1915
J. A. Lawton & Sons, South Australia	July, 1915
I. Murray, South Australia	July, 1915
S. A. Stiles, Ohio	June, 1915
J. A. Berthelsen, N. S. Wales	June, 1915
J. W. Ivil, Utah	June, 1915
E. L. Herving, Florida	June, 1915
G. R. Twedell, Mississippi	June, 1915
O. Siebler, Texas	May, 1915
Schintgen & Maier, Minnesota	May, 1915
Van den Wildenberg Brothers, Wisconsin	Mar., 1915
V. Priessnitz, Wisconsin	Mar., 1915
F. J. Ties, Wisconsin	Mar., 1915
J. Marshall, Indiana	Mar., 1915
H. D. King, New Jersey	Mar., 1915
W. E. Bedford, North West Territory	Mar., 1915
J. E. Johnson, Pennsylvania	Mar., 1915
Wyndham Mauk, Ohio	Feb., 1915
G. H. Longley, Massachusetts	Feb., 1915
H. N. Seeley, New York	Feb., 1915
J. A. McGaughey, Washington	Feb., 1915
S. G. Guinn, Pennsylvania	Jan., 1915
J. P. Young, Pennsylvania	Jan., 1915
A. E. Roesner, West Australia	Jan., 1915
Alf. Seidel, Nebraska	Jan., 1915
Brown & Peterson, North Dakota	Jan., 1915
H. F. Schreiber, Pennsylvania	Jan., 1915
A. C. Elder, Georgia	Jan., 1915
C. W. Enyeart, Indiana	Jan., 1915

Ten Questions for the Month

This month's questions are on smithshop equipment. They are all on subjects that every blacksmith—whether vehicle smith, machine smith, tool smith or any other smith—should know. These questions are on items that you deal with every day and which you should know intimately and thoroughly.

1—What is the pressure of the blast ordinarily used in a blacksmith's forge?

2—Is it best to locate the blower or fan near or at a distance from the forge? Why?

3—Should an anvil have a perfectly flat, level face? Why?

4—Give a simple rule for setting the anvil at the correct height.

5—Describe the differences in form between hot and cold cutters.

6—What material may be used for marking work that is to be heated?

7—What are the heating qualities of bituminous coal and charcoal?

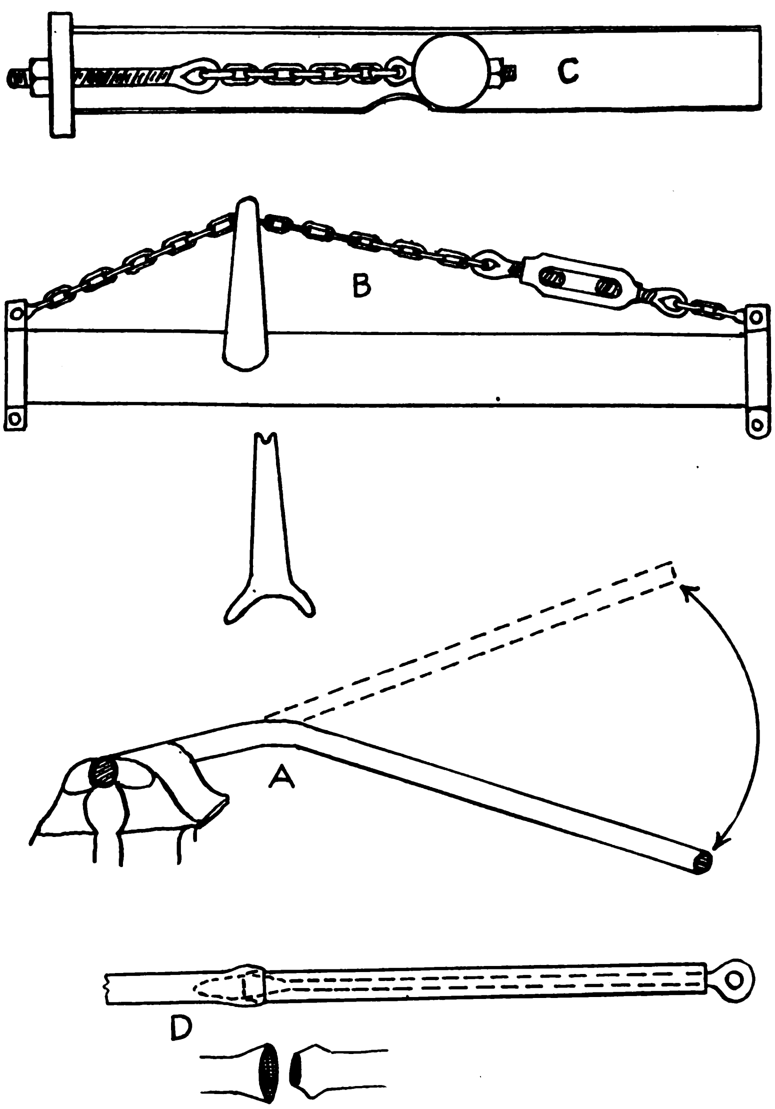
8—Is charcoal suitable for heating high-speed steels? Why?

9—Why is the handle of a hand hammer smaller toward the head than at the place usually grasped by the hand?

10—What is the correct height for a bench vise?

We contemplate making a change in the method of presenting these questions and answers. If you have a suggestion, let us know what it is. We admit frankly that for these past few months we have just been trying this new feature to see what you thought of it. We believe that this question and answer feature can be built into a larger and still more practical department. The numerous letters referring to the valuable and practical nature of these questions and answers tells us that this is a much needed addition to our pages, and it now remains for us to make it just as practical and valuable as it is possible to make it.

So let us have your suggestions. It is practically decided that this department will be changed in some measure, and your ideas will help us to make it the best possible.



PIPES AND TUBES MUST BE HANDLED CAREFULLY IN THE FIRE AND ON THE ANVIL

Answers to Questions in December Issue

1—Instead of giving strength, the crowding of too much steel or iron tire on the wheel is absolutely injurious—in fact, it weakens it very materially. There is a continuous overloading and, consequently, a weakening on account of the increase of dish which necessitates frequent re-setting. By the time a wheel has been in continuous service for three or four years the dish has become so pronounced that nearly all the tenons at the square end are broken, because of the strain of the tire.

2—A rim must be absolutely tight and close to the spoke shoulders or trouble is sure to result. A good method of driving the rims home, if they are not as tight as they should be, is to apply a rim tightener and, at the moment of tightening, strike the rim one single blow with the hammer. If done carefully this will drive the rim down just right. The use of the tightener also prevents the breaking of the rim.

3—A portion of the spoke tenon should be removed so that it will be slightly below the surface of the thread; however, if too much is cut away, water will settle under the tire and both tenon and rim will rot in a short time.

4—The objection to wedging rim tenons is in the danger of using too large a wedge and thus causing the tenon to split the body of the spoke.

5—A good coat of oil will keep out the dampness to which wheels are exposed in shipping or later in the shop if left standing in a damp room. If the tread of the wheel is primed with oil, slow or quick-drying lead or any other oily mixture, it should be done so that the grease will not penetrate into the tenon. It has been commonly supposed that oil in rim tenons is a good thing but those who have studied the subject most have come to the conclusion that the oil is injurious to the life of the wheel. Oil on the hub tenon certainly is injurious, more so, in fact, than on the rim tenon. The effect of oil on the tenons is to make them slippery, so that when the tire is getting loose these tenons are liable to work themselves loose from the rim, and with every turn of the wheel the rim pounds down on the shoulder.

6—When re-spoking a Sarven wheel it is best to remove the rivets by taking out every other one, i. e., suppose the rivets are numbered from one to eight, inclusive. Remove first rivets numbered one, three, five, and seven. Take out and replace the spokes on each side of these rivets, then bore new holes for new rivets, replace rivets in these and then remove the remaining rivets and proceed in a similar manner with the other spokes.

7—Draw the spoke, shave the front side of the hub tenon, make wedges as wide as the mortice, place in the hub mortice thick end down and on the back end—drive the spokes in and wheel will be as straight as a new one.

8—It is best to bore the hub so the box bears at the ends only, because if it bears for its entire length the ends are likely to wear, the box becomes loose and soon breaks.

9—The dish should be built into the wheel if the wheel-builder is competent to build it right. A shrinking of the tire holds the spokes out of the position in which they were originally placed, springing them more or less and breaking the tenons and mortice joints.

10—The "pitch" of an axle is the angle at which the stub is bent downward toward the thread end. The "gather" is the angle at which it is bent toward the front.

Bending, Stretching and Welding Pipes and Tubes

Bert Hillyer

In bending pipe, various ways have been tried to keep it from kinking—filling the pipe with sand and packing it down tight. The ends are then closed up by screwing a cap on, or wooden plugs are driven in tight. The pipe is then heated up where it is to be bent, and if the sand is packed in tight it will help to keep its shape. But care must be taken to see that the sand is perfectly dry, or the moisture in the sand will create a steam which being confined is apt to cause an explosion.

Another way is to fill the pipe with melted lead, and when the lead is set and hard the pipe is then bent cold. Afterwards the lead is melted out by being held over the fire. A ladle placed at the lower end of the pipe into which the melted lead is run.

Another way is to bend the pipe between two plates set a little farther apart than the diameter of the pipe. This keeps the pipe from bulging. A form is placed in the centre of the plates, the hot pipe is placed up against the form and two rods, made rounding at each end and 1/8 inch smaller than the pipe, are inserted in each end until they nearly meet where the center of bend starts. These are then pulled together; the rods gradually being worked out of the pipe as the bending goes on.

Another way is to have a grooved form and wheel. This does very well if a number of bends are to be made the same size. But where there are only a few bends to make and of different sizes, one of the best ways is to take as long a heat as the fire will heat properly, catch the end of the pipe between two posts and band slowly around. Have a can of water handy, which can be poured on the sections that are bent enough or where the pipe starts to kink. In fact, it should not be allowed to kink, and at the first sign of bulging it should be driven back with the hammer to as near a round shape as possible. When bending pipe hot, don't try to hold it in the part that is hot or let the hot part press up against anything, or it will surely cave in at the spot it touches. Depend on the water stopping the band in the right place. Sometimes a pipe or tube is cut a trifle short, through mistake. This can be stretched by heating up to a good heat, placing the end of the tube in the vise and working it back and forth. In bending back and forth, see A in the engraving, the outside of the pipe stretched first on one side and then on the other, thus increasing the length.

To bend brass pipe: anneal the part to be bent by heating to a very low red and cool off in water. The pipe is then bent cold. Large iron pipes, eight inches in diameter, can be bent in a common fire without taking the pipe from the fire by means of a turnbuckle and spreader, as seen in the engraving at B.

Large pipe that has been dented badly can be made true and even by forcing a ball through it, as in the engraving at C. The dented part is placed down in the fire, and as it gets red hot first while the top is cooler, the dent is pushed out as the ball passes through.

Welding stub ends on boiler tubes has been explained in this paper before, but nothing has appeared on the welding of two long pieces of pipe. First make a mandrel as shown at D. This should fit easily into the pipe; the end being bulged out to fit the pipe snugly and tapering both ways. The pipe is first scarfed and one end placed into the other. Both pieces are now placed in the fire, care being taken to keep them both perfectly level. Now take a good welding heat and strike the pipe on the ends to make a butt weld first. Then slip the mandrel into the pipe until its thick end is in the welded part of the pipe. Now pull the pipes back onto an iron block, which has been placed in the forge for the purpose, and weld the pipe with quick blows. If the mandrel sticks in the pipe after welding put a bar through the eye of the handle and strike one sharp blow on one end of the bar. This will loosen the grip on the mandrel and it can then be pulled out.

A SMITHY IN THE LAND OF THE THISTLE, RUN BY MR. CHARLES MATHER

The Legal Advantages and Disadvantages of a Partnership

Elton J. Buckley

If the average business man who enters into a partnership with another had any comprehensive idea as to the liabilities of the members of the firm for the acts of their partners they would probably consider the question of partnership with somewhat more care. While it is true that partnership has its advantages, it likewise has its serious disadvantages, and in many business men's minds the disadvantages far outweigh the advantages.

Most partnership troubles undoubtedly come from lack of care in organizing the partnership, coupled with a lack of understanding as to the pains and penalties of the partnership condition. There should always be a written partnership agreement, though the law does not always require it to be in writing if for less than one year. The better way, however, even in those States where it may be verbal, is to reduce the terms of the partnership agreement to writing and have it signed and sealed in proper form.

Naturally, the facts of each partnership differ, but the following form of partnership agreement can be used and adapted to almost any case:—

This agreement, made this ——— day of ———, 1912, between John Jones, party of the first part, and James Smith, party of the second part, witnesseth:—

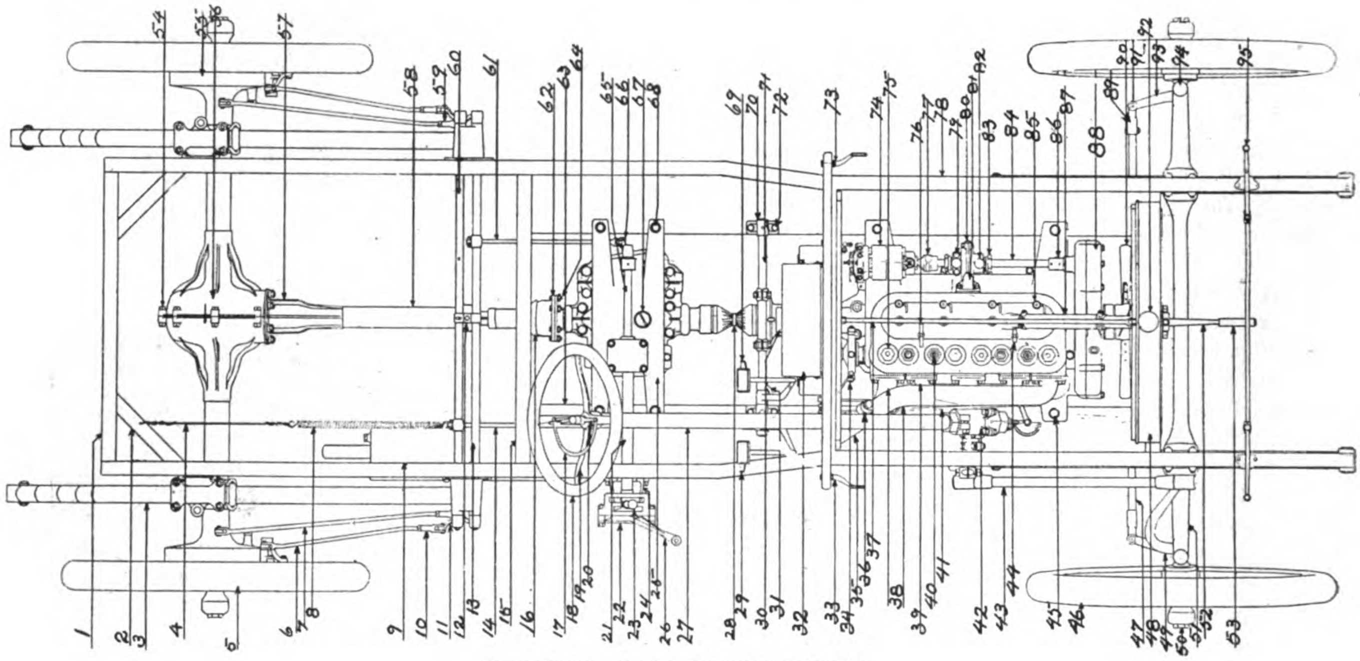
That the parties hereby agree to form and do form a trading partnership for the purpose of conducting a general blacksmith business under the name of Jones & Smith.

That the said partnership shall begin on the ——— day of ———, 1912, and end on the ——— day of ———, 1913, at which time it may be renewed by mutual agreement for such time as the parties may elect.

That each party shall contribute the sum of $1,000, which shall constitute the partnership capital, and each party shall receive an equal share of the profits earned, if any, and pay an equal share of the losses, if any shall be shown at the date of dissolution. At dissolution, the assets of the partnership shall be equally divided between the parties.

That both parties shall give their entire time to the business of the partnership; the party of the first part having charge of ——— and the party of the second part charge of ——— (here describe the respective duties of the partners, if each is to be given special work).

That neither party is to individually become bondsman, nor endorse any negotiable paper, nor become security or guarantor in any manner whatsoever for any person other than the partnership.



THE PLAN OF A HUDSON CHASSIS

1—Rear cross member.
2—Rear corner brace.
3—Rear spring.
4—Brake release spring wire.
5—Rear wheel.
6—Pull rod.
7—Pull rod.
8—Brake release spring.
9—Muffler.
10—Pull rod clevis.
11—Outside lever.
12—Brake rocker shaft strut
13—Brake rocker shaft.
14—Pull rod.
15—Middle cross member.
16—Universal joint.
17—Quadrant bracket.
18—Steering wheel rim.
19—Steering wheel spider.
20—Quadrant bracket.
21—Hand lever shaft.
22—Brake lever quadrant.
23—Hand lever.
24—Quadrant bracket.
25—Transmission case.
26—Hand brake lever.
27—Steering column.
29—Brake foot lever.
30—Clutch.
31—Clutch adjusting lever.
32—Spark coil.
33—Dash lamp bracket.
34—Timer.
35—Exhaust pipe.
36—Exhaust pipe flange.
37—Radiator brace rod.
38—Exhaust header.
39—Exhaust header gasket.
40—Spark plug.
41—Pull rod.
42—Steering gear case.
43—Steering gear connecting link.
44—Spark plug cable support.
45—Bolt.
46—Front wheel.
47—Cross rod.
48—Radiator.
49—Steering spindle.
50—Hub cap.
51—Front axle.
52—Starting crank.
53—Starting crank handle.
54—Gear case bolt.
55—External brake band.
56—Rear axle gear case.
57—Propeller shaft case flange.
58—Propeller shaft case tube.
59—Pull rod clevis.
60—Brake rocker shaft.
61—Pull rod.
62—Compression flange.
63—Right sub-member.
64—Flange bolt.
65—Brake shaft.
66—Pull rod.
67—Transmission case oil hole plug.
68—Bolt.
69—Clutch foot lever.
70—Rocker shaft bracket.
71—Rocker shaft.
72—Rocker shaft bracket bolt.
73—Dash lamp bracket.
74—Magneto.
75—Valve cover plug.
76—Spark plug cable support.
77—Magneto coupling center.
78—Left side member.
79—Pump body clamp.
80—Water pump.
81—Water inlet elbow.
82—Grease cup.
83—Front packing nut.
84—Water wheel shaft.
85—Priming cock.
86—Pump shaft coupling.
87—Hose, cylinder to radiator.
88—Crank case.
89—Adjustable end.
90—Fan blade.
91—Cross rod pivot pin.
92—Filler cap.
93—Steering arm.
94—Steering spindle pin.
95—Gas lamp bracket.

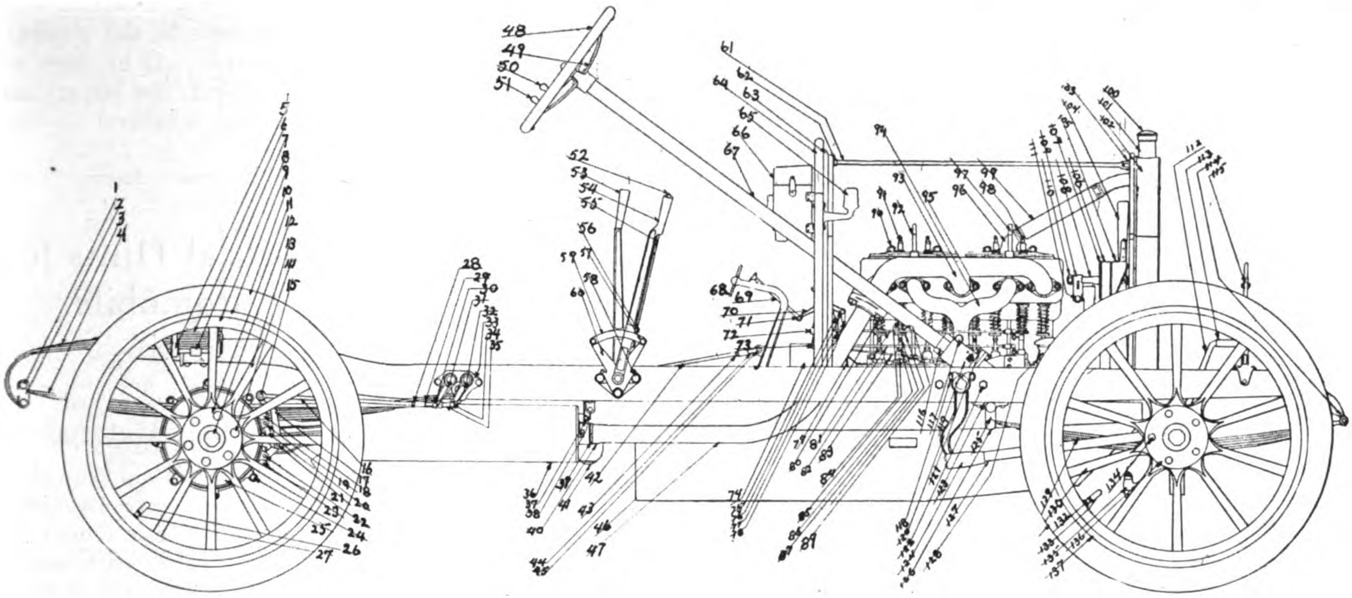
That neither party is to draw a salary in addition to his share of the profits.

That in case of the death of either partner, the partnership is not to be dissolved, but each partner shall appoint in his will the person whom he desires to represent him in the conduct of the partnership, such appointment in each case being subject to

As stated, this is subject to modification in the individual case. A partner does not need to contribute money to the partnership capital; he may contribute property, either real or personal, or even services alone. In

the chief reasons why so many partnerships are incorporating themselves into stock companies which go on forever, regardless of who dies.

A lawsuit begun against a partnership cannot be directed against Jones



SIDE ELEVATION OF THE HUDSON CHASSIS

1—Rear spring shackle bolt.
2—Rear spring shackle.
3—Rear spring, upper.
4—Rear spring, lower.
5—Rear spring clip.
6—Rear spring plate.
7—Rear spring clip spacer.
8—Felloe.
9—Rim clincher.
10—Rear wheel.
11—Felloe bolt plate.
12—Hub cap.
13—Spoke.
14—Hub bolt.
15—Pull rod end pin.
16—Pull rod.
17—External brake band lever.
18—External brake band stop pin.
19—External brake band cap.
20—External brake toggle link.
21—External brake band clip pin.
22—External brake band clip pin.
23—External brake band stop pin.
24—Gear case bolt.
25—Brake drum.
26—Stem dust cover.
27—Stem lock nut.
28—Pull rod adjusting nut.
29—Pull rod clevis.
30—Pull rod clevis pin.
31—Outside lever.
32—Outside lever.
33—Rear spring front hanger.
34—Pull rod clevis pin.
35—Pull rod clevis.
36—Muffler.
37—Muffler bolt.
38—Front muffler hanger.
39—Exhaust pipe flange.
40—Exhaust pipe clamp.
41—Universal joint.
42—Pull rod.
43—Pull rod adjusting nut.
44—Pull rod clevis.
45—Pull rod clevis pin.
46—Sod pan.
47—Exhaust pipe.
48—Steering wheel rim.
49—Quadrant bracket.
50—Spark hand lever.
51—Throttle hand lever.
52—Latch rod button.
53—Hand lever.
54—Hand brake lever.
55—Latch rod.
56—Filister head screw.
57—Hex. Hd. bolt, brass plated.
58—Hex. Hd. bolt.
59—Brake lever quadrant.
60—Quadrant bracket.
61—Radiator brace rod.
62—Hex. lock nut.
63—Dash.
64—Dash panel.
65—Lamp bracket.
66—Spark coil.
67—Steering column outer tube.
68—Brake foot lever.
69—Pedal rod.
70—Throttle control lever.
71—Pedal rod clevis pin.
72—Ball joint.
73—Throttle control rod eye.
74—Fly wheel.
75—
76—Bell crank.
77—Pull rod.
78—Control rod.
79—
80—Exhaust pipe flange bolt.
81—Control rod.
82—Pull rod.
83—Pull rod—throttle.
84—Valve.
85—Push rod guide.
86—Push rod.
87—Push rod adjusting screw.
88—Valve spring seat.
89—Valve spring.
90—Water jacket cover stud.
91—Spark plug.
92—Spark plug cable support.
93—Exhaust header.
94—Intake header.
95—Header stud.
96—Water jacket cover.
97—Spark plug cable support.
98—Hose band.
99—Hose, cylinder to radiator.
100—Filler cap for radiator.
101—Radiator.
102—Radiator.
103—Clevis pin.
104—Fan blade.
105—Fan hub.
106—Fan belt.
107—Fan hub.
108—Fan spindle.
109—Fan support arm.
110—Hex. nut.
111—Fan clamp lock.
112—Starting crank.
113—Starting crank handle.
114—Front spring bolt.
115—Gas lamp bracket.
116—Steering post adjustment nut.
117—3/8-inch bolt.
118—Steering lever clamp bolt.
119—Steering gear case.
120—Steering lever arm.
121—3/8-inch bolt.
122—3/8-inch bolt.
123—Front spring rear hanger.
124—Connecting link socket.
125—Front spring shackle.
126—Front spring bolt.
127—Connecting link tube.
128—Gear cover packing nut.
129—Front spring.
130—Spoke.
131—Front wheel.
132—Stem lock nut.
133—Stem dust cover.
134—Hub bolt.
135—Steering arm.
136—Hub flange.
137—Clincher rim.

the consent of the other party. In case there is no such appointment, or the appointment is not agreed to by the other party, the executor or administrator of said deceased partner shall represent his decedent in the conduct of the partnership. In witness whereof, the parties hereto have set their hands and seals, on this, the ——— day of ———, 1912.

——————————(SEAL)
——————————(SEAL)

Witnesses,
——————————
——————————

either case, if he is a sharer in the profits and losses and is the agent of the firm as all partners are agents he is a partner in every sense.

The provision regarding the conduct of the partnership after death is inserted in order to avoid the usual rule that when one member of a partnership dies the firm is dissolved. This is one of the serious disadvantages of partnership, and is one of

& Smith, but in order to stand must be brought against "John Jones and James Smith, trading as Jones & Smith." A suit begun by the firm must recite the personnel of the partnership in the same way.

The main disadvantages of partnership are the various ways in which one partner may be bound by the acts of the other. Here are some of them:—

1. A partner can bind the firm and with it the individual members by any act within the ordinary scope of the partnership business.
2. He may receive payment for a firm debt and give receipts, and the other partners are bound, even though he never turns in the money.
3. He may compromise or release a firm claim.
4. He may draw checks against the firm's assets and endorse and cash checks drawn in the firm's favor.
5. He may make contracts, even bad contracts, with reference to the firm's business which bind the other partners.
6. He may cancel insurance on the firm's property.
7. He may buy goods on the firm's credit, even though he thereby runs the partnership into overwhelming debt.
8. He may engage employees and make contracts with them that bind the firm.
9. He may acknowledge a debt, which binds the firm, even though the other partner subsequently repudiates it.
10. He may make promissory notes, even though he abuses this trust for his personal benefit, and the firm is bound. He cannot waive exemption for the firm in a judgment note, however.
11. He may borrow money on the firm credit, even to the point of mortgaging the partnership's personal property.

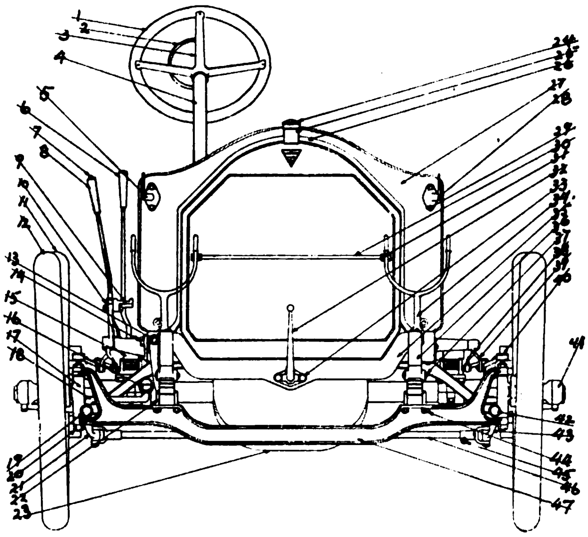
Even in another way the individual partner is liable for the acts of his fellow partner. He is liable for any loss to third persons caused by the fraud or wrongful act of his partner, if that act was in the ordinary course of business, even though he knew nothing about it and gave his partner no express authority to do it. This extends even to the misapplication of another's money by a partner; the firm must make it good, if done in the course of ordinary business.

In none of the above instances can the power of a partner be restricted except by agreement between the partners, which to be worth anything as against outsiders must be brought to their attention.

There is some protection, however. One partner may not acquire a private benefit as against the firm or buy up claims against the firm or renew a firm lease in his own name or deal in firm property for his own benefit, or make private commissions out of firm transactions, or confess judgment as against the firm, or give a guaranty which will bind the firm.

Another disadvantage is in the collection of debts against the partnership. A creditor of the firm may pursue his action both against the partnership property and against the individual property of the partners. Thus, an impecunious, reckless or dishonest partner can involve his fellow-member in serious disaster without the least danger to himself, particularly if he has contributed only services or some other intangible thing to the firm assets.

No partner may sell his interest in the partnership without the consent of his fellow-partner. If he does so without that consent, the buyer can assume no relation whatever to the firm.



FRONT VIEW OF HUDSON CHASSIS

1—Steering wheel rim.
2—Quadrant bracket.
3—Steering wheel spider.
4—Steering column outer tube.
5—Dash lamp bracket.
6—Hand lever.
7—Latch rod button.
8—Hand brake lever.
9—Quadrant bracket.
10—Brake lever quadrant.
11—Rear wheel.
12—Front wheel.
13—Steering lever clamp bolt.
14—Steering lever clamp nut.
15—Rear spring.
16—Connecting link socket plug.
17—Steering spindle.
18—Steering arm.
19—Steering arm nut.
20—Steering spindle nut.
21—Steering arm.
22—Front spring clip.
23—Sod pan.
24—Filler cap.
25—Radiator.
26—Radiator.
27—Dash panel.
28—Dash lamp bracket.
29—Brass cap screw.
30—Gas lamp bracket tie rod.
31—Tie rod lock nut.
32—Starting lever.
33—Nut.
34—Gas lamp bracket.
35—Front cross member.
36—Left side member.
37—Front spring bolt nut.
38—Pull rod clevis.
39—Outside lever.
40—Steering spindle pin.
41—Hub cap.
42—Steering arm nut.
43—Steering arm.
44—Hex. nut.
45—Adjusting end clamp bolt.
46—Cross rod.
47—Front axle.

Four Practical Hints for the Automobile Repairman

J. A. Cagley

Valve Grinding Material

A very good plan to keep the valve grinding material in a convenient form is as follows: I use a number of wide mouthed bottles with screw tops, these I fill about half full of common vaseline. I now place into each of the bottles a teaspoonful of emery flour of different grits; coarse, fine and extra fine. The coarse I use to begin with, the fine next and then I finish with the extra fine. No oil need be used. It does not spill and can be carried in the tool box very handily.

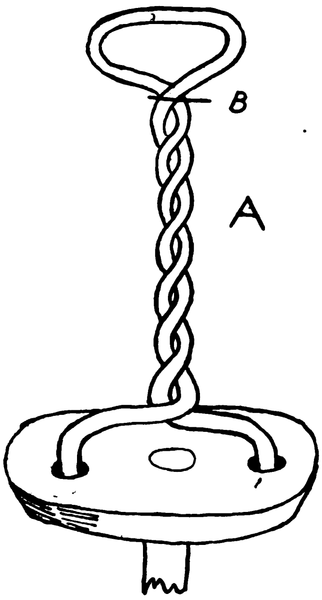
Valve Grinding Tool Made From Wire

It very often happens that a valve will require grinding when one has no tool with which to do the job. A very convenient tool made from wire is shown in the engraving at A. After finding the distance between the holes in the valve pallet, the wire may be twisted, leaving the handle as long as necessary to be handy. If it is to be used in connection with the bit brace, the head may be omitted, and the stem cut as at B. The little hooks at C should be just long enough to catch firmly into the holes in the valve head.

A Piston Ring Tool

When the piston has been removed from the cylinder, some device will be necessary to close the rings while slipping it back. A tool which is very easily made is shown at D. It consists of a piece of wire bent in a circle just a trifle smaller in circumference than the ring itself. This

wire should have a loop at each end, as shown at E to allow a pair of round-nosed pliers to be inserted to close the ring. A number of these



A VALVE GRINDING TOOL OF WIRE

rings may be made of different sizes and kept about the shop.

A Dime To Hold Compression

Many automobiles are equipped with a dual ignition system; that is, two sets of plugs. It happened that while driving one of these cars one of the plugs blew to pieces. I had no extra plug and was several miles from a place where I could get one. Of course, I did not need the plug for ignition, but I did need it to hold compression in that particular cylinder. After some little time I tried a silver dime and found it just the right size to drop into the plug after removing the lock nut which holds the porcelain in place. I dropped the dime G, into place as shown and fastened down with lock nut, H. This held the compression perfectly and I went home without further trouble.

Hickory—I

Sources, Uses, Preparation, Marketing and Suggestions

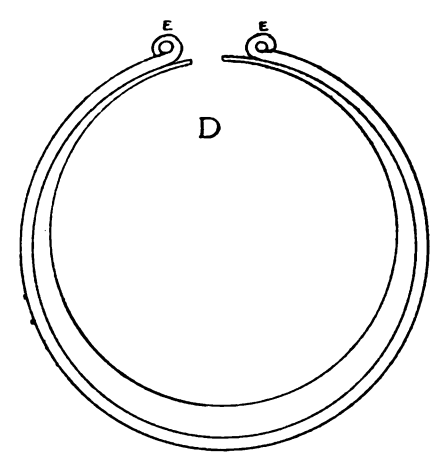
CHARLES F. HATCH
Statistician in Forest Products

Sources of Supply

Hickory in commercial quantity was once found in every State east and in several States west of the Mississippi River. It reached its best development and was found in greatest abundance in the Ohio and lower Mississippi Valleys. At present it is listed in the lumber cut of 34 States. This is evidence that its range is as wide as ever and that it has maintained a foothold in spite of two or three centuries of use and abuse.

It should not be supposed, however, that its quantity is what it once was. Hickory and black walnut were said to constitute one fourth of the original forests of tidewater Virginia. Many other large areas which once furnished much hickory now supply little. This is especially true of States north of the Potomac River, and is generally true north of the Ohio River also. Several other regions have passed their maximum production, and only fragments of the original stands remain. Most of what yet remains is found in the lower Mississippi Valley. No foreign country, except a little of Southern Canada, yields hickory, and no foreign country is successfully planting or growing it.

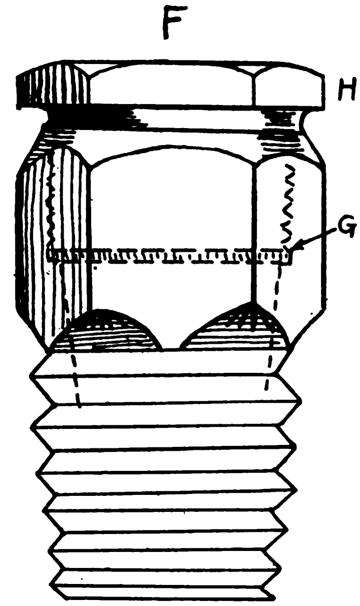
Hickory is often spoken of as though it were a single species, like yellow poplar or beech, yet there are 10 species. There is marked difference between some of them in both appearance and properties. All of the hickories are not found in the same region, but frequently several species grow near together. Arkansas has as many as any State, and there,



A TOOL FOR HANDLING PISTON RINGS

too, is the present center of production.

From the forester's point of view the tree possesses some striking advantages. Birds and small quadrupeds plant the nuts, and the young trees put up a strenuous fight for existence. If during a young hickory's first years the part above ground is destroyed, the root sends up a sprout to repair the damage. It may do this repeatedly after fires or other enemies have destroyed the top.



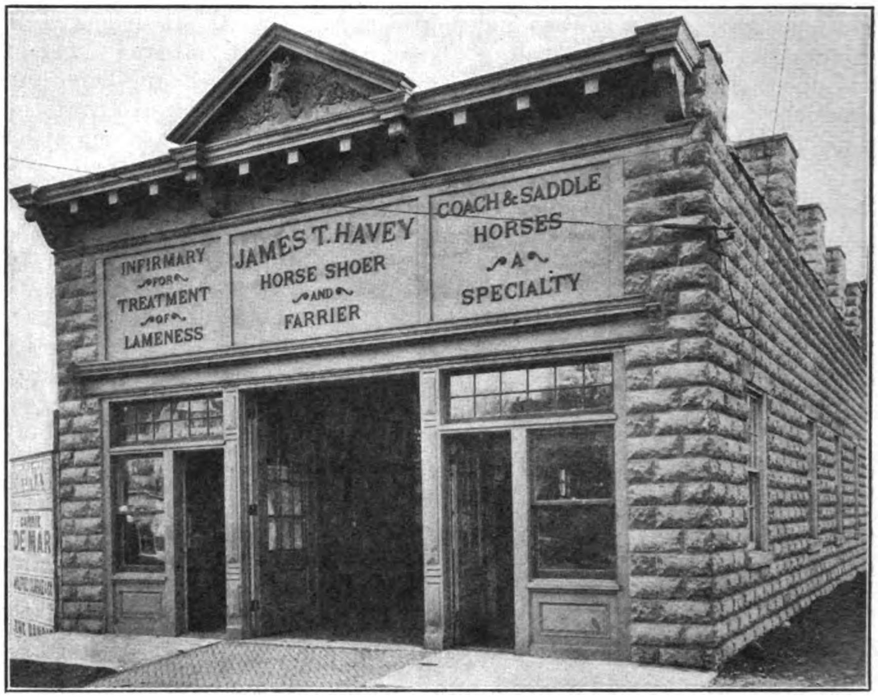
A REPAIR THAT COST A DIME

The vigor with which it sprouts and the habit of birds and small mammals of planting the seeds have made it possible for hickory to hold its ground over so wide a region.

Hickory does not and never did form pure forests of great extent. The trees are scattered among other timber. This holds for unculled forests as well as for those partly cut. Where an average stand of from 200 to 400 feet of hickory per acre is found upon tracts of considerable size it is fully up to the lumbermen's expectation. It is important that the manner of its growth be borne in mind, for several other factors of its yield are influenced by this. Hickory neither grows like many other commercial timbers nor can it be cut and marketed in the same manner. It is a peculiar wood in several respects—in growth, properties, uses, and marketing.

Uses of Hickory

Its combination of strength, toughness, and elasticity has made hickory the world's foremost wood for certain purposes. It offers supreme resistance to strains, twists, and shocks. The superior place held in many countries by the American ax is due as much to the hickory handle as to the steel in the bit. The same may be said of American hammers. The enviable reputation of harvest machinery made in the United States



THE MODERN YORK STATE SHOEING SHOP, RUN BY MR. JAMES T. HAVEY

has placed it in every important grain-producing region of the world, and to the use of hickory is due much of its success. Other woods are satisfactory for heavy vehicles where strength is the chief requisite, but for light, graceful, handsome, springy buggies, carriages and traps, hickory is unequaled. It goes into wheels, poles, shafts, spring bars, and other straight and bent parts. The lightness and resiliency of the American racing sulkies have won universal admiration, and their superiority is due to hickory. The severe thrust, strain, twist, and compression which automobile wheels must sustain demand spokes of absolutely the best material obtainable, and for this the manufacturer is dependent on hickory.

Exacting demands are made upon this wood from other quarters. With the possible exception of ash, no satisfactory substitute for it has been found for sucker rods used in pumping oil wells. These rods must be clear and straight pieces, from 18 to 35 feet in length, long strings of them being coupled end to end to reach the bottom of deep wells. Hickory will sustain nearly as much load on a longitudinal pull as a rod of iron of the same size, and it weighs less than half as much. Sucker-rod buyers demand the best parts of the choicest hickory. Skewer manufacturers are making some use of hard maple, beech, birch, basswood, and persimmon. Hickory, however, imparts the least taste, and will not break or splinter when thrust into the meat or candy. Ash and hard maple are used to some extent for picker sticks. The strength and toughness of hickory, however, places it first for this purpose.

At present the principal demand for hickory comes from vehicle manufacturers and handle makers, and the mill men largely depend upon this demand for their market.

Hickory, however, is put to many other uses. For some of these it is the best procurable wood, but for others it is no better than several woods which may be had as cheaply and in as great abundance. When good hickory is employed for purposes which might be supplied by cheaper and more abundant woods, it is said to be a "wrong use." A material suitable for highly specialized uses should not be wasted in common and ordinary places, but reserved for purposes which no other wood can fill so well.

Table 1 shows the extent to which hickory is rightly and wrongly used in States where it is now most abundant and in others where it is now scant. The table shows that more hickory goes into wrong uses in regions where it is cut in rather small quantities than in places of abundance. This is due principally to the difficulty in marketing it in small lots. Mill men who cut but little, and that little in mixture with other woods, can not take as much pains to find the best markets as the man can who has many grades and a large stock.

A review of some of the past and present uses of hickory for purposes other than vehicles, handles, sucker rods, skewers, and parts of agricultural and textile machinery, which are and should be the chief uses, will

AN INTERIOR VIEW OF MR. HAVEY'S CONCRETE SHOP

show both economy and waste to a greater extent than will the history of any other wood. What at the present time would be folly and waste, however, was not necessarily so in the past. Hickory withes—sprouts from 2 to 5 years old, 3 to 10 feet long, and from one fourth inch to an inch in diameter at the ground—have been cut in countless millions, and every one was a young hickory tree. They were once the common farm repair material for mending gates, fences, wagons, sleds, and machines. They tied everything from the broken fence panel to the fodder shock. Nails, rope, and wire have been substituted for withes in most farm repair work. The hoop-pole cutter was as great a destroyer. Every one of the untold millions of poles was a promising young tree, the straightest and smoothest to be found, and exactly the kind to grow into spoke stock and sucker rods, had it been spared. Hickory hoop poles sometimes sold as low as $1.50 a thousand—a thousand promising young hickories for $1.50, because no one had then learned that one mature tree could be worked into a thousand hoops equally as good.

Hoop-pole cutting of that kind is chiefly a thing of the past, and the withe is less frequently pressed into service; but hickory still has many questionable uses. Some of these are justifiable under the circumstances, and under the conditions which at present obtain in the industry, but others are wrong and need correction. If a tree is inherently defective, that is, worm-eaten, or if its wood is brashy, or very knotty, its use for barn siding is justifiable. In the same way, if a tract of hickory is inaccessible, even though relatively near a market, or if it is fairly easy to get at, but far removed from the manufacturer, the use of the trees for purposes for which other woods are suitable should not be considered wasteful, provided, of course, that the other woods could not be secured as cheaply.

On the other hand, in some parts of Pennsylvania hickory goes into mines as posts, props, rails, cribs, and lagging. There are perhaps 50 kinds of forest trees in that region as good as hickory for mine timbers, many of them better, for hickory is not an enduring wood in damp places. In West Virginia, oil-well derricks are occasionally made, in part, of this wood; while in parts of Missouri and in other regions, where it happens to be convenient, it is taken for bridges, barn floors, and doors, fences, sheathing, piling, culverts, crossties, car stock, and for other similar purposes. Such uses are included under "wrong" in Table 1.

In most instances these uses are unnecessary and wasteful. They are brought about, however, by present methods of cutting and marketing the stock. The farmer owns the hickory timber and, on account of the scarcity of other wood, is forced to use it about the farm. The sawing is done by mill men, who move from place to place, and use the engine that runs the farmer's thresher, corn shredder, clover huller, or ditching machine The sawyer is paid by the thousand feet, and in his effort to turn out the greatest possible quantity of lumber, carelessly cuts a larger percentage of low-grade stock than necessary. Such practice is on a par with a custom, once rather common, of splitting black walnut for fence rails. The difference is that the owners of black walnut know better now, while some hickory owners have the lesson yet to learn. An expert sawyer could probably make it more profitable for the hickory owner to sell to the vehicle or handle factory and buy other woods for his building purposes. The use of hickory for certain products in place of inferior wood would be greatly reduced by operating the central distributing yard discussed under "Lumbering and Milling" in this report.

Statistics collected during this investigation show that 31,000 cords, or approximately 22,000,000 feet, of hickory are yearly demanded by the 473 meat-packing establishments in the United States for smoking meat. That does not include what farmers cut for their own smoke-houses, which is probably as much more. More than 25 different woods are listed as suitable for smoking meat, yet all of them together do not equal the amount of hickory. Nearly all reports state that hickory is more satisfactory than any other wood for smoking meats. It emits a maximum of smoke with no increase of heat; it imparts a pleasant flavor; it gives the meat a bright, clear, yellow color that is uniform over the entire surface; it burns slowly and thus cures the meat thoroughly; and it smokes the meat with a minimum amount of shrinkage. In order to satisfy the United States regulations restricting the amount of shrinkage, many packers sprinkle their wood with sawdust.

(to be continued)

TABLE 1.—*Uses of hickory*

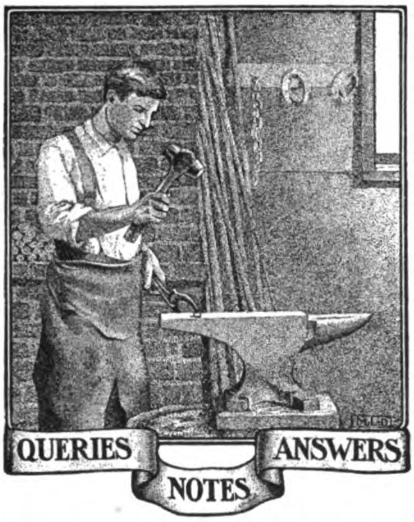
States where hickory is now most abundant	Right.		Wrong		Doubtful *		Part right, part doubtful or wrong	
	Number of mills reporting	Per cent	Number of mills reporting	Per cent	Number of mills reporting	Per cent	Number of mills reporting	Per cent
Arkansas	50	74.6	.....	....	9	13.4	8	12.0
Indiana	106	54.7	23	11.9	37	19.0	28	14.4
Kentucky	48	60.0	5	6.3	18	22.5	9	11.2
Missouri (southeast portion)	104	96.3	3	2.8	.....	....	1	.9
Tennessee	39	60.0	3	4.7	15	23.0	8	12.3
Louisiana	16	66.7	1	4.2	5	20.8	2	8.3
Mississippi	22	78.6	1	3.6	5	17.8	.....	....
Missouri (ex. southeast portion)	22	22.9	50	52.1	4	4.2	20	20.8
Connecticut	35	76.1	.....	....	9	19.6	2	4.3
Georgia	2	28.6	1	14.3	3	42.8	1	14.3
Iowa	2	20.0	2	20.0	4	40.0	2	20.0
Michigan	10	76.9	.....	....	3	23.1	.....	....
North Carolina	44	89.8	1	2.0	3	6.2	1	2.0
Pennsylvania	51	37.5	34	25.0	24	17.6	27	19.9
Virginia	24	66.7	3	8.3	8	22.2	1	2.8
West Virginia	41	50.6	10	12.4	21	25.9	9	11.1
Total	616	59.2	137	13.2	168	16.2	119	11.4

* "Doubtful" covers cases where the mills failed to state the use to which the lumber was put.

An Up-to-Date York State Shop

JAMES T. HAVEY

The accompanying engravings show my shop of concrete. The building is 70 by 28 feet, with a 14-foot ceiling, and a skylight 10 by 36 feet. There are plenty of windows for light and ventilation and everything has been done to make the shop as comfortable as possible for the men. The four fires are run by electric blowers, and at each forge is running water for cooling work. My equipment also includes one L. S. P. calking machine. I intend to put in three more of these, for I think the labor of calking shoes will soon be a thing of the past.



Wants Kentucky Prices.—I would like to know through the columns of THE AMERICAN BLACKSMITH the general prices charged by blacksmiths for different kinds of work and for material in the State of Kentucky. ARTHUR SPALDING, Kentucky.

A Question on Steel Work.—I would like to ask through the columns of THE AMERICAN BLACKSMITH the following question: In what proportions is sugar of lead and hypo used for blueing steel?
J. BRENT, South Africa.

Repairing That Cracked Bell.—If Brother G. Schrade of Australia will drill a hole at the end of the crack in his bell, then with a hacksaw follow the crack to the hole he has drilled he will have repaired the bell as well as such a job can be done. By putting on a patch he will kill the sound of the bell as it is now killed by the crack, but by sawing the crack he will restore the sound.
A. L. ERICSON, Illinois.

A Busy Shop.—It may interest you to know that we average about 160 shoes per day in my shop, with five men and an apprentice boy. Often we go as high as 200. Today, for instance, it is now 4 P. M. and we close at 5:30, we have already put on 186 shoes. So we will probably go well over 200 before closing. I think there are few shops in your country that can equal that quantity per day.
A. L. VARRIE, South Africa.

About Cash Business.—I would be pleased to hear from some of our brother smiths, who have instituted a strictly cash business, as to how it works out, if it has any effect on trade and how their customers take it, etc. It seems the blacksmith is the last man the farmer thinks about paying, although he is the first man that is thought of when a break-down occurs.
A. L. ERICSON, Illinois.

This is a timely topic. We hear of cash groceries, cash meat shops and cash stores of all kinds. Now let us hear about the cash blacksmith shop. This topic is of interest to every smith shop owner—let us have your ideas, suggestions and criticisms.
THE EDITOR.

Removing That Shaft.—In reply to Brother Steadman of Florida, as to how to remove the broken shaft on a McCormick mower, I would suggest that he remove the point box by loosening the set screw. Then drive a thin wedge inside of shaft which does not take much to hold it. It will be necessary to remove the rear gearing; that will give plenty of room to get at the pinion. Set a blunt chisel in bottom of cogs and hit with hammer; this will loosen the pinion the same as loosening a nut. In case he cannot get the box out, it being brass, it would allow for a thin, hard wedge.
L. A. PIGUET, Kansas.

Wants Information on Hickory.—I would like to know something about hickory. Will some brother living around the timber country give a little information. We have no timber to equal it for coach work in wheels, reaches, axle beds and other uses. The hickory used in axe handles, picks and other tools is far superior to anything that we can buy here. Ours is mostly all varnish work and has to be without a flaw, so I was wondering if we could not buy in America the very best. Also give us an idea of the price per foot or plank and what sort of soil is required to grow the trees in, the amount of seeds you plant, where procurable and the best climate.
C. LUHRS, South Australia.

NOTE.—A paper written by Charles F. Hatch, Statistician in Forest Products, and published by the U. S. Department of Agriculture, begins in this number. Mr. Luhrs and others interested in hickory will find much of interest and value in Mr. Hatch's report. EDITOR.

Wagon Tires and Carbon Steel.—Does a wagon tire expand any more after it is a very dull red? If so, approximately how much?

Also would like to see the question of carbon in steel fully explained, as some speak of 1 and 1½ per cent, while others of 100 or 150 points. Do both mean the same amount? A SUBSCRIBER, Colorado.

IN REPLY.—The matter of carbon content and the methods of expressing it are puzzling to a great many smiths. It all becomes quite simple, however, when you understand that a point of any element is one hundredth of one per cent of that element. Therefore, 100 points equal one per cent and 150 points equal one and one half per cent. If a steel is said to be 50-point carbon steel, it contains fifty one hundredths of one per cent of carbon (.50).
L. H. J., New York.

A Mixture for Hardening Shares.—I like "Our Journal" very much and would not be without it for several times the cost, I find so much that is helpful; and I especially like the question corner and believe it will be of great benefit to the trade. One brother asked if there was anything better than water to harden plowshares and shovels. I have used the following, with good results:

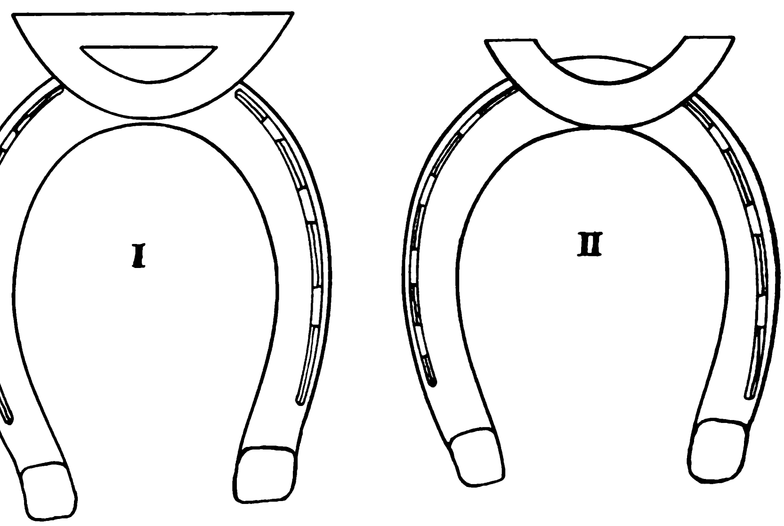
2 ounces Cyanide of Potassium.
2 ounces Salammoniac.
1 ounce Bicarbonate of Soda.

Pulverize the first two and then add the third and mix thoroughly. Heat to a dark red and sprinkle on the face side of the shovel. If it is not hot enough to make mixture flow well, heat to the proper temperature and dip. D. E. FISH, Oregon.

To Repair That Cracked Bell.—I notice a request from Mr. Sebrade of South Australia for some way to fix a church bell. If the cracks are not too long, let him take a heavy hacksaw or if he has not a heavy one let him put two blades together in his holder and saw out the crack, first drilling a small hole at the extreme end of the crack. The bad sound is caused by the rough edges rubbing against each other when the bell vibrates. To my mind the riveting of any plates, either brass or steel, on the bell will make it sound worse, for it deadens instead of sharpens the tone. The saw cut will have the effect of raising the note and sharpening the tones. Of course, if the crack is very long this may be impracticable, because of weakening the bell, but if the crack is short this is the best way to fix it. E. G. S., New York.

Shoeing the Toe Dragger.—Replying to H. R. Denize of New Zealand with reference to shoeing that drag toe, will say that if dragging the toe is due to some injury of the anatomy or a jack-bone spavin which often causes drag toe then the shoes I recommend are not to be used at all.

Suppose, however, that it is the common case of a steep-foot short toe, allowing the foot to roll over easily permits dragging the toe. In such cases the shoe recommended not only prevents wearing away of the hoof, but will create such action in getting over the toe of shoe as to pitch the foot away in a manner to prevent dragging of toe A common machine shoe may be used by welding the attachments (made of toe steel of proper size) to toe of shoe as shown in the cut, which may be made in two styles. The amount of extension or projection of the steel over the toe will be governed by the conditions of the horse. The shoe in Fig. 1 will afford plenty of wear and protection. LESTER W. SIMS, Missouri.



TWO SHOES THAT MAY BE USED ON THE TOE DRAGGER

A Letter From South Australia.—Although I am only a young subscriber I greatly appreciate "Our Journal." It is about as full of information as an egg is full of meat. I enjoy reading the letters from brothers on topics that touch the spot, also the advertisements keep a fellow posted on the most up-to-date, labor-saving devices.

Brothers Metcalf and Hillyer are "the goods" for solid advice. I declare both of them artists in their way. I will trouble Brother Hillyer for designs of rein rails for buggies and sulkies. Australians don't take kindly to malleable or brass rails; they want them forged. I would also like to see different dies and tools for use under the trip hammer for making articles such

as shaft jacks, buggy clips, equalizing bars, etc. In fact I would like to see more on blacksmithing, the making of fifth wheels and all the belongings to a carriage. We have to forge everything over the anvil and consequently are not in the same paddock with you "Yankees" when it comes to output. C. LUHRS, South Australia.

How to Bronze Steel.—Could anyone give me information or a receipt for imparting a bronze finish on steel?

A. C. F., Michigan.

IN REPLY.—Take five parts of each of the following: nitric ether, alcohol and muriate of iron and six parts of nitric acid. Mix these ingredients and then add ten parts of sulphate of copper dissolved in fifty parts of water. Then prepare the steel by removing all oil, grease and dirt from the surface of the steel and then paint with the above solution, or dip if the parts are small. L. M. J., New York.

On Wheels and Wheel Work.—In reply to Brother E. A. Mountain's question on wheels, in the November issue, it is not usually good practice to put leather in the joints of felloes. In most cases there is enough play either at the hub or rim to allow the joint to come together without dishing. However, there are cases where the repairman has cut his felloe too short and placed leather between, which, however, may be lost in a short time. You will have to use your own judgment. The amount of draft depends on the wheel and on your customer. For buggy wheels that already have enough dish, after shrinking the tire give from $\frac{1}{16}$ to $\frac{1}{8}$ inch draft, leaving the heat in the tire, but if your customer is one that wants them to stay tight for about ten years, give them a little more. On a wheel that has been loose in the hub or felloe, after you think you have them up tight, run saw in the joint. For a wheel that has never been loose in the least, all that is necessary is that the ends of the felloe don't bind. G. N. SIDDERS, Ohio.

Price, Not Work, the Difficulty.—That article "Some Smithing Thoughts and Experiences" reminds me of a smith who joined the union and forgot to use his stamp, thinking he might lose a customer. In some parts here in Ohio a blacksmith would not think of charging thirty cents for fifteen minutes of work. He would give it to his customer, so that he could get his next job. It also reminds me of a place where I was working. All the smiths went into the union and the very next morning my boss commenced to plan how to cut prices. He told me when I finished a piece of work that came to fifteen or twenty cents not to charge the customer. Mr. Chism is right, they all have a faint heart and where they build up they tear down. THE AMERICAN BLACKSMITH should teach how to charge, instead of how to work, for it is impossible to find a town or city where prices are the same. They all have the same disease—weak mind and faint heart.

A TRAVELING SMITH.

Several Shoeing Questions.—We have about two hundred and fifty horses to shoe and find many difficult cases. We give the following ways in which we have treated different cases and would like other brother smiths to give better and easier methods, if possible.

Forging: We concave the fore shoe, no heels, diamond toe hind, toe clips, wedge and calk.

Interfering: We shoe with a feather edge straight shoe, well set up on the inside and nailed around the toe.

Foundered feet and sand cracks: We put on bar shoes for this with low calks.

We also have been shoeing trotting horses, one with sidebone and stiff sinews and another with ringbone. We have used several methods of shoeing, especially for the one with sidebone, but are unable to make him sound.

Then I would like to know how to prevent nails from breaking. We have a great many heavy horses in this locality with grease heels and scratches who are always stamping, and we find that the nails break on the inside. We shoe with a clip for this and with globe nails.

J. BURKE & SONS, Ireland.

More Cold Setter Talk.—I see the cold tire setting question is still on, and suppose it always will be. I guess, however, I can hold up my end of it. Brother Norris of Alabama thinks I do not have the right kind of a machine. I have the same as he claims to have, but perhaps mine doesn't work according to my ideas the same as his does to his. I used my machine the way a machine should be used and I think it would be a very dense blacksmith that would not understand the principles of one of them. But I think it takes a pretty good blacksmith to get a wheel ready for the tire. My advice to any brother that wants to buy a cold tire setter is to go somewhere and see one in operation first. I do not have much faith in these testimonials that some of the different companies put out, such as putting on "four or five tires in ten minutes," or "my twelve-year-old boy can operate them," etc. I stand ready to answer any questions any brother may ask me on tire setting. In next month's number I will give eight different reasons why cold tire setting doesn't pay a blacksmith.

JOHN SHAY, Pennsylvania.

The Cold Setter Again.—Mr. W. K. Huff said in his first article on cold tire setting that he intended to purchase a cold setter, but he evidently could not get any brother to answer his question as to how a tire can be made smaller than the wheel. In my estimation it is very easily seen that a tire cannot be placed on a wheel which is larger than the tire. The tire must first be expanded until it is larger than the wheel it is to go on.

Mr. Huff wants to know how to make a tire smaller than the wheel. Take the wheel, remove the rim plates and saw out the required amount and set it cold until it is tight and that is all that you can do the old hot way. If money is so plentiful with Mr. Huff he had better invest in a cold tire setter, as I don't want it. Mr. Huff can take a wheel solid in the hub, take the tire off and make it as small as he can to get it on. Then, when it is cold, let me place it on my cold setter and I can bind it still tighter. And I can prove this at my shop, if necessary. J. P. ALTLAND, Pennsylvania.

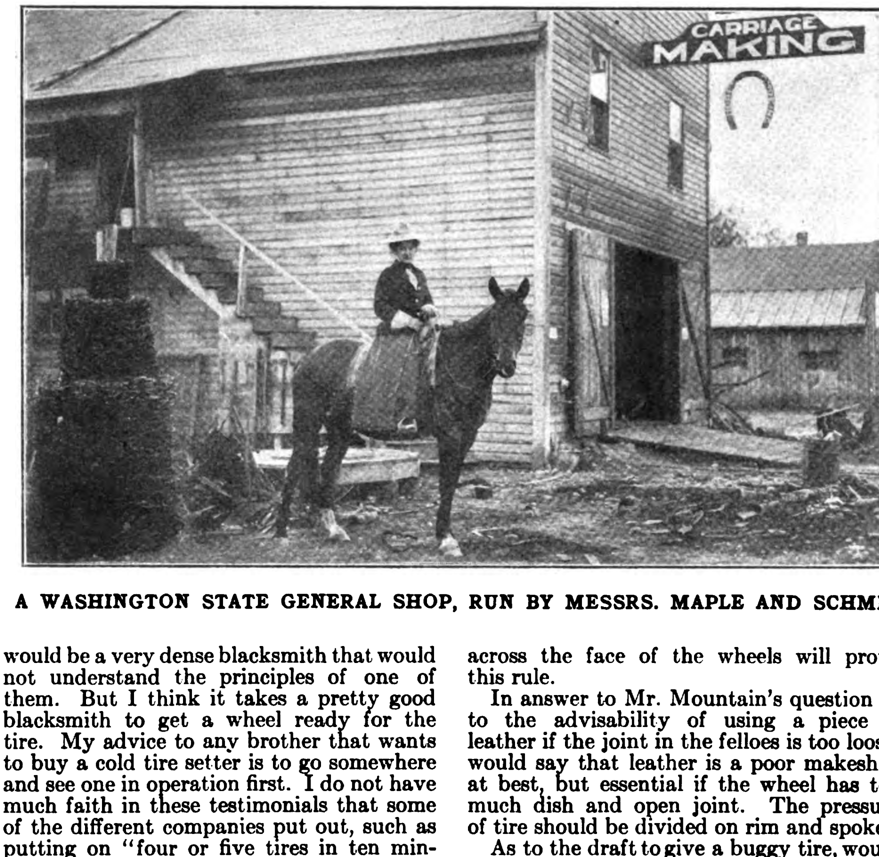
Setting Axles and Tires.—In answer to Mr. Miller of Kansas as to the way in which to set buggy axles. Set wheels to a plumb spoke bearing and gather slightly to the front. The length of the axles should be regulated by the difference in the height of the wheels. If the wheels are the same height the axles should be the same length. Wheels for general use on truck wagons are three and four feet. The front axle should be $\frac{5}{16}$ of an inch longer, which allows $\frac{10}{32}$ of an inch to each front wheel for the additional height of the back wheels and their dish. If this rule is followed and a plumb spoke is given in the set of axle the wheels will track perfectly, and a straight edge test across the face of the wheels will prove this rule.

In answer to Mr. Mountain's question as to the advisability of using a piece of leather if the joint in the felloes is too loose, would say that leather is a poor makeshift at best, but essential if the wheel has too much dish and open joint. The pressure of tire should be divided on rim and spokes.

As to the draft to give a buggy tire, would advise that the thickness cold, with spokes all up tight, should be scant. With all the spokes up tight the felloe joint should be the width of a thin saw run through without pinching. W. H. GUNN, Virginia.

South Dakota, Not Missouri.—I would like to say that your paper is a great helper to a smith and I like to read it as soon as it comes and see what others have to say for themselves. But I tell you, brothers, there is quite a little "roasting" going on among the craftsmen who are writing. It seems funny that one always wants to be a little smarter than the other, but I suppose that is human nature.

I would just like to say a few words to W. K. Huff about tire setting. I have a cold tire setter, also, and I would not be without it. And I think that if you had one you would be of the same opinion. There is one thing sure and that is that people are further along in improvements than they were twenty-five or fifty years ago. If you don't believe in cold tire setting, then why don't you make your horseshoe nails? Well, perhaps you do, but I hardly believe so. Now, Mr. Huff, I have a good tire setter,



A WASHINGTON STATE GENERAL SHOP, RUN BY MESSRS. MAPLE AND SCHMID

the Scientific, and it does scientific work. I have set tires with it for four years, and in that time have not been compelled to set more than a dozen the second time. For the past two years it has been very dry in this part of the country, but the tires did not loosen up. If you can set tires better the old way I would like to see it and I am not from Missouri.

My shop is 22 by 30, with an addition 16 by 20, and is equipped with two Royal blowers, two anvils, one drill press, Western Chief No. 14, Hawkeye trip hammer, emery wheel and polisher, Wonder disc sharpener, cold tire setter and also a Mole tire shrinker, I. H. C. engine, 5-horsepower, and all the necessary small tools. I have an 8-inch feed grinder and get fairly good prices for my work. J. A. Stellner, South Dakota.

Welding Steel Axles.—I invited discussion on this point some time ago. Mr. McGill, in the September number recommended taking three heats, if I understand him right. I would be a bit discouraged myself if I had to take three heats on each steel axle I welded.

I find no difficulty in welding them, only a little more care is required than with iron; in fact, I very rarely take two heats, usually finishing with one. In preparing my weld I make a good fire in order to cake it well before the welding. I next scarf my ends straight on the under side, hooking the point of the scarf well. Before placing in the fire for welding I clean the dirt from the bottom of my fire, put on a little dry green coal in the bottom which lights very readily and soon forms a clean white heat. Also see that the axle is well up from the bottom of the fire and keeping the scarf well through the fire to prevent burning. I use nothing but the iron scale which I gather from around my anvil mixed with a little clean sand, which makes a very good flux. In placing the axle on the anvil for welding I instruct my helper to place the under scarf point just over the edge of the anvil towards me, which prevents it from getting cold while putting in the top scarf. But in starting I put in the top scarf with my hand hammer, which is half the work finished. Then with the sledge hammer strike a few gentle blows. This is my method of doing steel axles and I have never had one break or come apart, although I have welded a very large number in this way. In welding hard or cast steel I use the Laffitte welding plates, which in my experience has no equal in steel welding. I trust this will help Mr. Davis of South Australia. Wm. W. Watt, South Africa.

How to Sharpen Lawn Mowers.—In reply to Brother Hildreth of New York City for information relative to sharpening of lawn mowers, I would say that I have sharpened a good many lawn mowers and they have given satisfaction. I reverse the dogs so that the machine runs backwards. Also make a crank to turn the machine by fastening it to one of the wheels. Then place your mower in a vise so that the cutter bar is nearly flat, just slanting a little to the cutting edge. Then use common machine oil on the cutter bar and sprinkle with No. 80 grain emery. You can easily tell how thin the oil needs to be. The faster the machine is run, the faster the emery will cut it.

I notice that Brother B. A. Hickey of New Jersey has an article on sharpening lawn mowers, in the November issue, which merely states "adjust the cutting bar." There is no foundation to his statement at all, because the center of the knives wears faster than the outer ends and the ends will touch when the center is a sixteenth of an inch away.

We have no organized prices here and, of course, have to set our own prices and depend on good work to bring us customers. I do only wagon work; no blacksmithing at all. My shop is connected to a blacksmith shop and we each do our own work. We give you below a few prices:

Wagon poles, old irons, each	$ 4.50
Tongue hound, each	1.50
Bolsters, each	3.50
Sand boards, each	3.50
Axles, each	5.00
Hind hounds, each	1.50
Bent hounds, each	5.00
Buggy shafts, each	2.25
Buggy cross bars, each	1.50
Buggy poles up to 2½ inches, each	4.50
Buggy poles up to 3 inches, each	5.00
Buggy poles circles	1.50
Buggy bodies, hand-made, old irons	15.00
Spring wagon beds, old irons	20.00
Horseshoes, common, new, each	.50
Horseshoes, common, reset, each	.25
Horseshoes, Neverslip, each	.75
Horseshoes, Neverslip, reset, each	.35
Neverslip calks, each	.05
Bar shoes, each	1.00

G. L. DeWitt, Montana.

A WASHINGTON STATE EQUIPAGE, BEFORE THE SHOP OF MR. J. A. GILMOUR

An Interesting Florida Letter.—I like The American Blacksmith paper above all others. It gives more good, sound, practical hints than all the trade papers combined.

I have been at the trade for twenty years and I am still learning something new every day. I am located in the tobacco belt and have all kinds of work to do, from repairing a steam engine down to plow work. I do a great deal of painting, such as repainting buggies and wagons and farming machinery.

A man came into my shop the other day and claimed to be a blacksmith. He bought a second-hand anvil, a hammer and an old leather bellows which had seen service in the Confederate army in the early sixties. He told me that he could do anything that any other man in this country could do. He now cuts prices on anything to get a job from one of my customers, but the first job is usually the last. He put on a set of axle points one dollar cheaper than my price, and the next day the man brought his buggy to me to fix. On examining it I found that the smith had welded four left-hand axle points on and the man could not keep the nuts on the spindles; the wheel would run off every hundred yards or so. There are four shops near here beside mine, but I get as much as I can do, with two helpers. I tried to get one of the other smiths to subscribe to The American Blacksmith. I told him that it would teach him not to weld on four left-hand axles. He said the paper was of no account and that he could not learn anything from it. I kindly agreed with him, as I think that he could learn hardly anything with a life study in a good college.

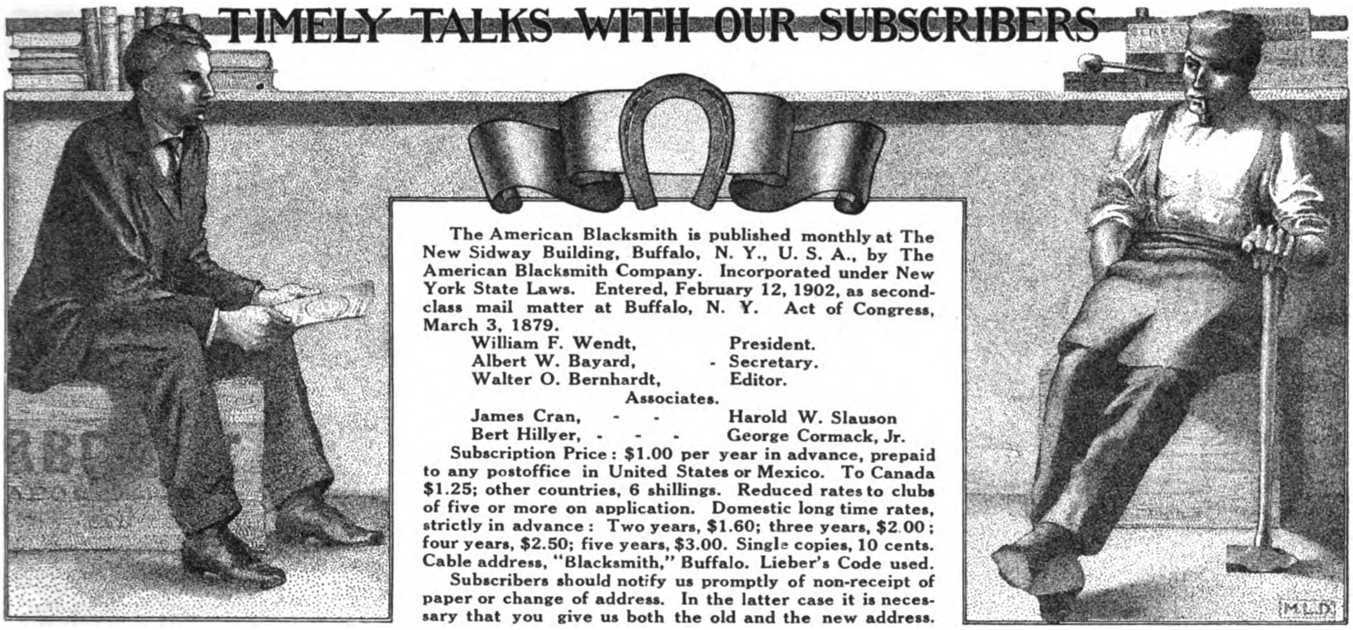
I would like to have some brother give me plans for making a mortising machine.
T. J. Steadman, Florida.

An Interesting Letter From Montana.—We have a good country here with plenty of work of large variety. Last summer I did work for seven or eight plow engine outfits; also some automobile work. In the winter we do anything that comes along; build wagon beds, grain tanks, hay racks, cutter gears, etc., in fact, anything I can get to do, including harness work. But we have far too many blacksmiths here that either haven't had experience enough to run a shop or else who are naturally careless and could not do a good job if they tried.

I have never used a cold tire setter, but have seen them used and have read a great deal about them, and I think it would take a pretty strong-minded man to show me where they have any advantages over the old way of setting tires. But as I am not experienced enough to try and tell some of our older brothers how to do things I will only say that I believe the man who uses the cold tire setter is the same kind of a man that you see knock a tire off a wheel and them mark his tire wheel with a piece of chalk that measures ⅜ of an inch across the face. And if he can get it to come on one side or the other of that chalk mark he would call it a good job.

We get fairly good prices here for work, as there are very few blacksmiths in these parts that make a practice of cutting prices. I have known one or two who tried it, but they soon gave it up.

I have heard it said that a man who spends all of his time cleaning up his shoe never gets anything done, but I have always felt that the man that has a place for everything and everything in its place is the more prosperous looking man of the two. There are not many mornings in the year that I do not sweep out my shop and put the tools in place. One man I worked for had his shop looking like a scrap heap and after I had worked a couple of weeks and got it pretty well cleaned up a man came in and said, "Well, you have a clean looking place, anyway." My employer said, "Yes, I always clean up every morning." Then he went on and gave him a forty-dollar talk on keeping the shop picked up and this made me so angry I wanted to quit right there. Herbert McHardie, Montana.



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American Blacksmith Subscriptions

like other blacksmith shop necessities are now sold through jobbers. Ask your jobber or his salesman about the ease and convenience of subscribing through him.

The following jobbers are now selling American Blacksmith Subscription Coupons (other jobbers will be named as soon as arrangements can be completed):

Shattuck-George Iron Co., Wichita, Kan.
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Barlow Hardware Co., Corry, Pa.
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Association Secretaries

Arrangements will also be made with the secretaries of the larger associations to handle American Blacksmith Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

How We Stand

The directory of technical and mechanical papers recently published by "Advertising and Selling Magazine" tells more vividly than anything we can say about the popularity and actual true worth of The American Blacksmith. This latest list contains the names of 726 technical and mechanical publications. And of these 726 papers there are only 18 with a circulation larger than The American Blacksmith has. In comparison with the other papers in the smithing field The American Blacksmith has more actual subscribers than any two.

There are reasons for this. There are reasons why The American Blacksmith is the real live smithing paper. It's because of the heaping quantity of reading matter—because of the high standard of its writers and contributors—because it stands back of the craft ready and willing always to do the fair and square thing—because it gives its readers what they want, what they can use—information of real cashable value. That is why The American Blacksmith leads in the smithing field and that is why it continues to grow in favor.

Contents, February, 1912

Better Than Practical Experience

There are just three ways of knowing things—First, by experience; Second, by listening to others; Third, by reading. Of the three, they tell us that experience is best. And it is, too, but it's mighty slow for these high-speed days. By listening to others your field is still larger, but by reading you bring yourself in touch with the whole world. And, therefore, reading in order to know things is better than experience, and especially if you read The American Blacksmith. And don't take our word for it—read what subscribers say.

Mr. H. R. Van Gorder of Iowa says: "Any man who thinks he knows it all ought to take The American Blacksmith. I have learned as much through this paper as I did in several years in some shops, and I have only read the paper for one year."

A paper that can in twelve numbers give a man more actual information than he can get out of several years in real shop experience must be "delivering the goods."

Then Mr. M. E. Moore of Michigan comes along with a letter in which he says: "I would not think of running a shop without The American Blacksmith, as it made me what I am. Together with the paper and experience any man should be able to turn out any kind of a job."

Another reference to experience, and he does not place it ahead of reading a good craft paper.

And experience may be broad or it may be narrow. A man may have worked all his lifetime in one shop and have had a long experience, but his experience cannot be as broad as the man's who had worked in several shops. But, The American Blacksmith is carrying information to men of long experience as well as those of broad experience. Mr. W. Lovick of Missouri, has had both a long and a broad experience. He says: "As a craft journal The American Blacksmith stands A1, and I think with my experience I should be able to know. I am fifty-seven years of age and have spent most of my best time with the largest manufacturing firms in England. I was also for twenty-one years beside the forges in the Royal Arsenal at Woolwich."

That experience should teach a man something about smithing—yet Mr. Lovick considers "Our Journal" A1. Tell your neighbor.

A MODERN CORN HARVESTER

The Gasoline Engine

Its Principle of Operation Explained

A GASOLINE engine is a very simple machine. In principle it is exactly like a gun. In a gun the shot is fired by exploding powder behind it—in a gasoline engine we explode gasoline behind the piston in exactly the same way.

There are some differences, of course. When the charge goes out of the gun, that is the end of it. But in a gasoline engine, after the explosion drives the piston before it, in order to get any work out of the machine, this piston must come back and a new charge must be exploded behind it. The burnt gases and heat must be disposed of and all of these things must be done over and over again very quickly and at exactly the right time.

Now, there are two ways of doing this and consequently two kinds of engines. The first, which is called the two-cycle engine, does it all in two strokes of the piston, one up and one down. The other, called a four-cycle engine, does it in four strokes, two up and two down.

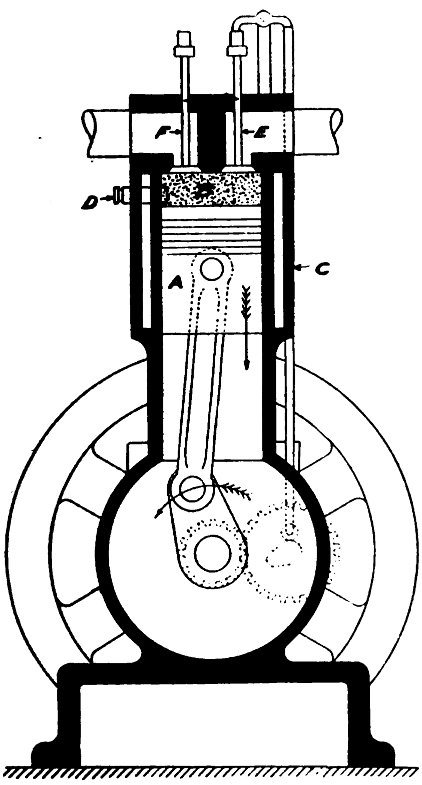


FIG. 1—POSITION, OF PISTON JUST AS SPARK IS ABOUT TO OCCUR

In our description we say that the piston moves "down" or "up", as in the case of an engine having the cylinder upright. Some engines have the cylinder horizontal or lying on its side, so that the piston moves back and forth instead of up and down. The operation is exactly the same, however; the stroke when the piston pushes the crank over or away from the cylinder corresponding to the down-stroke of an upright engine, and the stroke the other way or returning corresponding to the up-stroke of the upright engine.

Now, let us begin with the two-cycle engine and start with the explosion of the charge in the cylinder.

This explosion forces the piston down through the cylinder and the motion is transmitted through the connecting rod or pitman and the crank shaft to the flywheel.

The space in which the crank revolves is enclosed and air-tight on a two-cycle engine and is always filled with gasoline vapor mixed with air. This mixture is made in the carburetor or mixing valve, the gasoline coming from the tank and the air from an opening made for that purpose.

When the explosion forces the piston down, the lower part of it comes into this enclosed crank case and compresses the mixture with which the space is filled, so that it is ready to rush into the cylinder as soon as the top of the piston gets down far enough to uncover an opening or port which will allow it to do so. As this gas rushes into the cylinder it helps to push out any burnt gases remaining from the explosion, although most of these gases have gone out of their own force through an exhaust opening or port which was uncovered by the descending piston just before it uncovered the inlet opening.

When the piston starts up again it quickly covers both openings, and as it travels upward in the cylinder it compresses the gasoline mixture into a very small space at the end. Just as the piston gets to the end of its stroke, a short distance from the end of the cylinder, an electric connection is made and a spark of electricity jumps between two points through the compressed gas and explodes it, just as the spark from the primer in a gun explodes the powder.

Then all of these things are done over again.

A four-cycle engine does the same things, but differently. The explosion takes place and the piston moves down exactly as in a two-cycle engine, but there is no opening at the bottom of the cylinder out of which the burnt gases rush when the piston reaches the bottom. Instead, there is an outlet or exhaust valve at the top of the cylinder, and when the piston

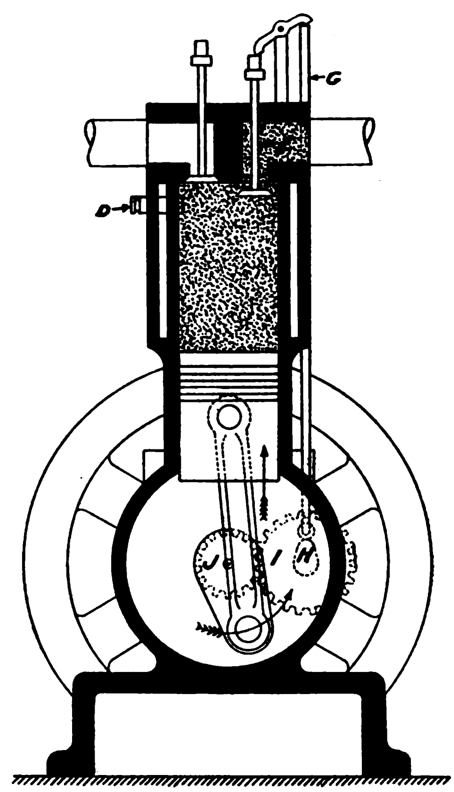


FIG. 2—END OF POWER STROKE AND BEGINNING OF SCAVENGING STROKE

starts to come back again this exhaust valve is opened from the outside and the burnt gases are pushed out through it by the piston itself. No charge has been taken in as yet, but when the piston starts down again the exhaust valve closes and the downward movement of the piston in the enclosed cylinder produces a vacuum or suction which opens the inlet valve and pulls in a charge of gas which comes directly from the mixing valve or carburetor, instead of from the crank-case, as in a two-cycle engine.

When the piston gets to the bottom of the stroke, the suction stops and a spring closes the inlet valve. The exhaust valve remains closed also, and as the piston comes up through the cylinder it compresses the gas. Just as the piston reaches the top and starts down again the electric spark jumps through the mixture, exploding it, and the whole series of operations takes place over again.

The four operations—explosion, exhaust (sometimes called "scavenging" and meaning the pushing out of burned gases), the taking of a new charge and the compression of it—each has a separate stroke of the piston, and hence the name four-cycle. The four strokes are generally called working stroke, exhaust stroke, suction stroke and compression stroke.

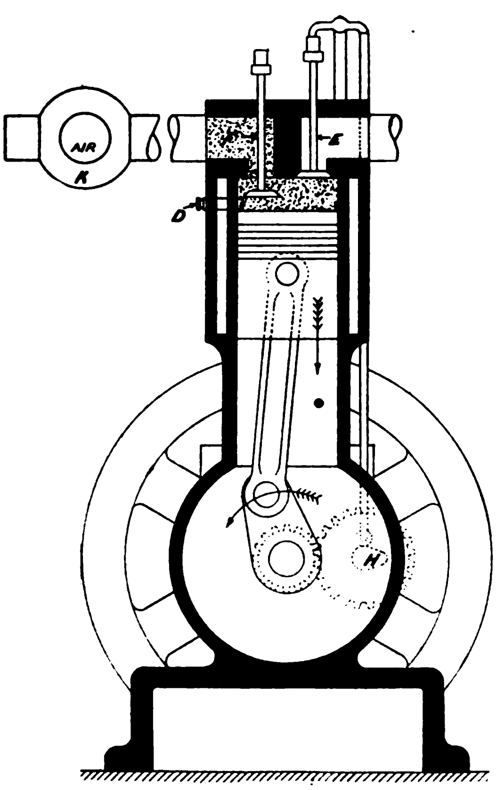


FIG. 3—THE BEGINNING OF THE SUCTION OR INTAKE STROKE

While a two-cycle engine lets out the burned gases and takes in a new charge in the time that it takes the piston to finish its down-stroke and begin its up-stroke a four-cycle engine uses all of one up-stroke to get rid of the burned gases and all of one down-stroke to take in a new charge. Moreover, the exploded charge gets out of the cylinder by its own pressure in a two-cycle engine, whereas a four-cycle engine has to push it out.

You can readily see that a two-cycle engine, taking an explosion at every revolution, will furnish more power at a given speed than a four-cycle engine of the same size which explodes only on every other stroke. You can see, also, that the two-cycle engine, having no idle strokes, runs much more steadily than a four-cycle engine. Moreover, a two-cycle engine has no gears or valves and is therefore a far more simple machine.

Having given a general idea of how two-cycle and four-cycle engines work we will describe their operation in detail.

First, the four-cycle engine:

All four-cycle engines have the same or similar parts and work in the same way, although the design or the arrangement of the parts may be much varied in different engines.

As reference to the diagrams will make this explanation clearer we will refer at once to Fig. 1. In this diagram, A indicates the piston at the time of the explosion. The mixture of gasoline in the form of vapor and air is greatly compressed in the space B between the piston and the upper end or head of the cylinder C. A spark is just passing between the points of the spark plug D, and exploding the charge. We will describe the making and timing of this spark a little further on.

The inlet valve F and the exhaust valve E are both closed. The force of the explosion, therefore, has no outlet and consequently forces the piston, which is free to move, downward through the cylinder.

In Fig. 2 the explosion has taken place and the piston, having gone as far as possible, is commencing to go back up through the cylinder, the momentum of the flywheel carrying it along. The exhaust valve E is commencing to open and the burned gases are passing out through it partly from their own force and also because the piston, as it comes up, pushes them out. As the exhaust valve has to open against the pressure in the cylinder it must be operated by some outside force and is connected to the rod G, which runs down beside the cylinder and ends just above the little wheel or cam, H. This cam is larger on one side, and this projection coming up under the rod as the cam revolves lifts it and opens the valve. As the valve should open only once in two revolutions of the engine, or every other time that the piston goes up, the cam is geared to the engine shaft by a cog wheel which operates the cog wheel of which the cam is a part. The one with the cam on it is marked I, and it has twice as many cogs on it as the one marked J which is attached to the shaft of the engine

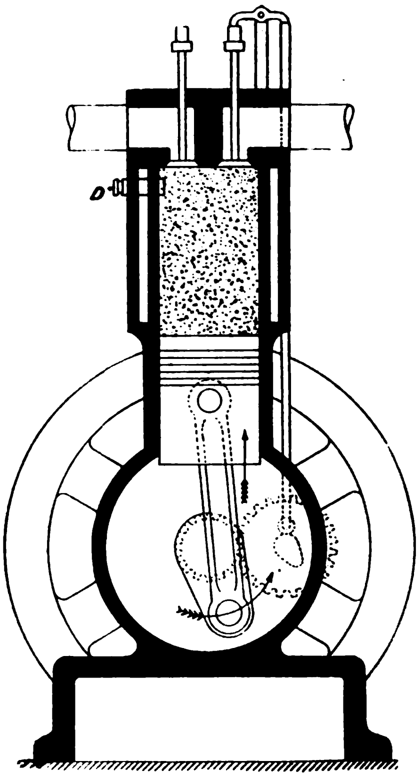


FIG. 4—THE BEGINNING OF THE COMPRESSION STROKE

and consequently turns only once while J turns twice. These cog wheels are called the two-to-one gears.

The piston having reached the end of its stroke and pushed the burned gases out through the open exhaust valve is still carried along by the momentum of the fly wheels and starts to go down through the cylinder again. (See Fig. 3.) The cam H has moved around one quarter of a revolution and thus allows the spring to close the exhaust valve E. The downward motion of the piston in the enclosed cylinder produces a vacuum or suction and this opens

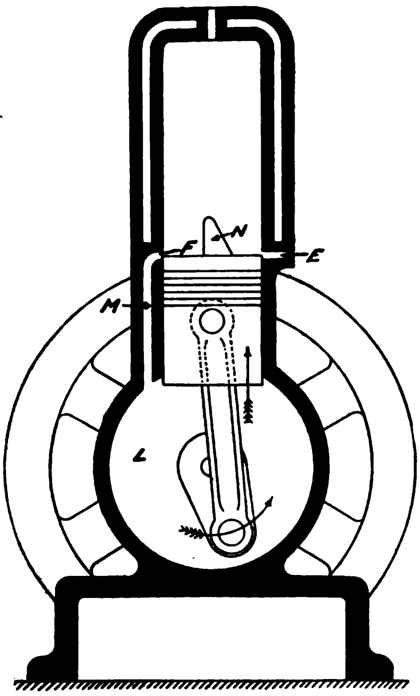


FIG. 5—THE TWO-CYCLE ENGINE OPERATES DIFFERENTLY

the intake valve F which is held closed by a spring much weaker than the spring on the exhaust valve. Through the open inlet valve, then, the charge of air and gasoline is sucked by the descending piston from the carburetor or mixing valve K. The gasoline reaches the carburetor or mixing valve from the gasoline supply tank through the pipe at the left and the air comes in through the opening marked "Air".

When the piston reaches the bottom and starts back (Fig. 4), the suction stops and the spring closes the inlet valve. The exhaust valve is also closed, and as the cam which opens it is only half way over it cannot open until the next up-stroke. So the piston comes up through the cylinder, still carried along by the momentum of the flywheels, and compresses the mixture which has just been sucked in. At the top the spark again jumps between the points of the spark plug, another explosion takes place and the whole series is done over again.

The two-cycle engine:

In a two-cycle engine, referring to the diagram marked Fig. 5, there are no valves in the top of the cylinder as there are in a four-cycle engine, but you will note two openings on opposite sides of the cylinder at the bottom marked E and F. At E is the exhaust opening or port and F is the inlet opening or port. These two openings are open or uncovered only when the piston is near the bottom of the stroke, and are covered and thus closed tightly at all other times by the piston itself. They take the place and do the work of the valves in a four-cycle engine.

The crank case L, that is the space in which the crank revolves, is enclosed on all sides, the piston forming the top. The gasoline vapor which is mixed with air in the carburetor, just as in a four-cycle engine, is drawn into this enclosed crank case by the suction produced by the upward stroke of the piston, instead of being drawn into the cylinder by the piston's downward stroke. The downward stroke of the piston, which you will remember forms the top of the crank case, compresses this mixture slightly, the average pressure being about five pounds to the square inch.

(Continued, page 128)

Installing a Stationary Gasoline Engine

C. E. Leslie
(of the I. H. C. Service Bureau)

The blacksmith's gasoline engine is usually of the stationary type equipped with iron sub-base, gasoline pump and separate gasoline tank for installing outside of the building. To install such an engine the first thing to do is to provide a substantial foundation.

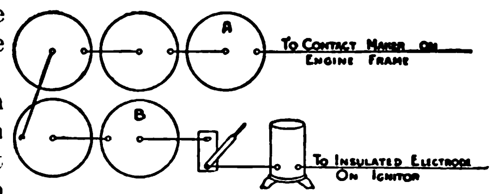


FIG. 1—SIMPLE WIRING PLAN FOR MAKE-AND-BREAK ENGINE WITH BATTERIES

Where it is possible the foundation should communicate directly with the ground. Concrete makes the ideal material, although stone or brick will answer nearly as well. Where it is not possible to provide separate foundation the engine may be set on a good solid floor. If the engine is to be on the second story it should be set close to a solid wall.

When convenient, it is best to locate the engine so that the belt will drive as nearly as possible to the center of shafting from which power is to be obtained. The center line of the engine must be exactly at right angles to this shafting, and the pulley of the engine must be perfectly in line with the pulley which is to receive

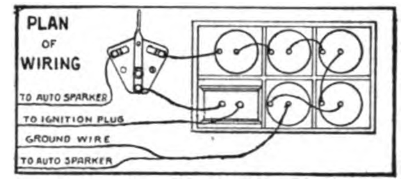


FIG. 2—WIRING FOR MAKE-AND-BREAK WITH BATTERIES AND ALSO EITHER MAGNETO OR AUTO-SPARKER DYNAMO

power from the engine. To obtain the best results possible, the distance from the line-shafting to the crank-shaft of the engine should be at least from six to eight times the diameter of the larger pulley. The exhaust piping should be as straight and as short as possible. Exhaust gases should be discharged out of doors. It is dangerous to discharge these gases into chimneys or other enclosed spaces. Mufflers to quiet the noise made by the exhaust can be used to good advantage—the location will be determined by the particular design of muffler.

The fuel tank should be located outside of the building below the level of the engine. Most manufacturers furnish special tanks for stationary use which can be buried in the ground so that the evaporation is very slight. In a majority of States insurance regulations require the tank to be located thirty feet from the building and below the level of the engine and equipped with an overflow pipe from the engine mixer.

The cooling tank can be set in any convenient place near the engine. Where running water is to be used a valve should be provided for regulating the amount of water which enters the jackets so that the cylinder is not kept too cool. The exhaust water should be quite hot—at least 180° F. The engine room should be as free from dust and dirt as possible, and good light should be provided near the engine so that the parts can be examined and cleaned frequently.

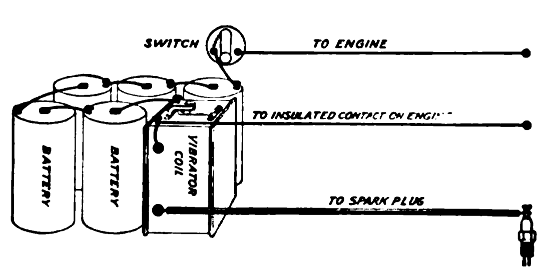


FIG. 3—PLAN OF WIRING FOR JUMP SPARK SYSTEM WITH BATTERIES

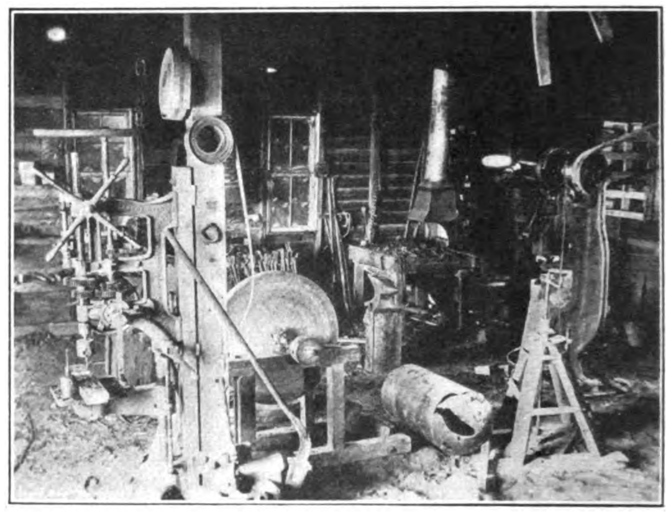
A Power Shop of North Dakota

H. J. Hanson

The accompanying engraving shows the power corner of my shop. We do all kinds of repair work, woodwork and engine repairing. I am interested more in plow work than in horseshoeing. My equipment includes a six-horse gasoline engine, a power hammer, an emery stand, a drill press, a power blower, a circular saw, a disc sharpener, a feed mill, a grindstone and a shear.

We do horseshoeing, but are not as fast as some of "Our Journal" readers. I enjoy the paper and think there is a chance for all members of the craft to broaden their knowledge.

MR. C. B. CHILDS OF OHIO AT HIS LATHE



A CORNER OF MR. H. J. HANSON'S POWER SHOP

Facts About Gasoline Engines

P. E. Floyd
In *Gas Power*

The purpose of this article is to help engine owners understand many points about their engines which are not explained unless they ask.

The single-cylinder, four-cycle engine takes in gas, explodes it, exhausts and compresses once in two revolutions of the crank, in the order named. For this reason, the timing gears must run in a two-to-one speed relation.

The gear on the crank shaft, called the small timing gear or crank shaft gear, runs the same speed as the crank, the gear carrying the cam for opening and closing the valves is called the large timing gear or cam shaft gear. This gear runs one half the speed of the crank. The cam shaft gear has twice the number of teeth as the crank shaft gear.

It can be readily seen that each valve, providing the intake valve is mechanically operated, will be opened once in each revolution. In order to get best results from the engine, as worked out by experiments, is to "time" the valves as follows:

The exhaust valve should open 40° to 45° measured on the circle made by the crank pin, before the piston reaches the end of its exhaust stroke, and should be held open 8° to 10° after the piston has started on the suction stroke. The inlet valve should open immediately after the exhaust closes, and should be held open 12° to 15° after the piston has started on the compression stroke. If the inlet valve is automatically operated, the valve will open just as the exhaust closes and will close just as the piston starts on the compression stroke. A gain in power is made here by having a mechanically operated valve.

In multiple cylinder engines the exhaust and intake cams are set with the proper relation to each other on the cam shaft and are "timed" to the first cylinder, all other cylinders will follow in proper "time."

There are two forms of electric ignition used, the "make-and-break" and the jump spark. The "make-and-break" is most common on slow speed engines. It gets its name from the manner in which it works and is a low tension system. Two electrodes are brought together by mechanical means and separated quickly, which makes the spark. The electrodes are brought together, called making the circuit, about 45° before the piston reaches the end of the compression stroke. This short circuits the ignition system and gives time for good contacts and higher voltage, which results in a hotter spark. The circuit is broken 10° to 15° before center for an early spark, and 5° to 10° after center for a late spark. This is known as early and late "break." The late "break" is only used for starting. Early "break" gives more power and uses less fuel. Advancing the spark on stationary engines will not increase the speed, as with marine and automobile engines, for the speed is taken care of by the governor. Early "break" will bring the engine up to speed quicker and hold it there better than late "break".

The jump spark is a high tension system. The low voltage from batteries or low tension magneto goes through a vibrating coil, which makes a high voltage and causes a spark to jump across the points of the spark plug. The points of the plug should be about $\frac{1}{32}$ inch apart. If the space is more than $\frac{1}{32}$ inch, the voltage is not high enough to cause the spark to jump and, if less than $\frac{1}{32}$ inch, the spark will not be hot enough and will cause misfiring. For advancing and retarding a jump spark, the same figures hold good as for the "make-and-break" system stated above. Too early a spark will cause pounding in the cylinder.

The hot tube is another type of ignition and is not so desirable nor so economical as the electric, and is only used in places where the electric is impossible. The hot tube is used

in damp places, such as water stations for railroads, in mines, etc., also on portable engines running in the rain.

A little explanation of this system will not be out of place here. The tube is placed in the cylinder usually in a vertical position and is about four inches in length and opens directly into the combustion chamber. The tube is heated by a gasoline blow torch to a red heat and kept so all the time the engine is running. As soon as the compression gets to a sufficient pressure the charge is ignited from the hot tube. Hot tube ignition is late, which decreases the power. The only way to advance the ignition is to heat the tube closer to the cylinder and even that will not cause the charge to explode before dead center enough to increase the power.

Hot tube ignition is not put on engines unless specified and even then they are most always equipped with the electric as well as the hot tube.

The two forms of governors used are the "hit-and-miss" and the throttling. The "hit-and-miss" is most common on small stationary engines up to 60 h. p. When the engine is up to speed, the governor comes into play and holds the exhaust valve open, locks the intake and breaks the ignition circuit. This is known as "cut-out." While the exhaust is open, the engine on the suction stroke takes air in through the exhaust and blows it out through the same passage on compression. No fuel is taken in nor no spark made. The engine runs this way until it starts to fall below speed, then the governor releases the exhaust valve, unlocks the intake and makes a spark. Explosions are taken in their regular order until the engine gets above normal speed. While the exhaust is open it gives a chance to clean out and cool off the cylinder. An engine running properly will only take one explosion once before "cutting-out" on no load, and at full load should only take from 18 to 20 explosions before cutting-out. Engines are over-loaded when more than 25 explosions are taken.

Slow speed, "hit-and-miss" engines are not desirable for electric light plants when lights are connected to generator, but the high speed, well balanced and close governed engines do very well.

The throttling governor engines are used mostly on electric plants, pumping engines, kerosene, producer gas and large stationary engines above 60 h. p. In this type of governor the mixture of gas and air is given to the engine in the proper quantity needed. The right mixture is determined by test, and the gas and the air valves set. They need not be changed, and the proper charge at all speeds will be taken care of by the governor. A speed regulation of less than 3% change can be had with the throttling governor which comes within the "Standard Regulation for Electric Generators."

The throttling governor should be used on kerosene engines, because the cylinder has no chance to cool off. A hot cylinder is essential for kerosene, and if the "hit-and-miss" governor is used another means must be provided to heat the gas. The most common is to heat the intake pipe from the exhaust.

The speeds of engines can be placed in round figures as follows: Ordinary stationary four cycle engine from 250 to 200 r. p. m., two cycle, 700 r. p. m., special electric, 300 to 350 r. p. m., two cycle marine, 700 to 1000 r. p. m., automobile from 800 to 1200 r. p. m.

City and natural gas engines must have higher compression than gasoline or kerosene engines in order to get the same power from the same engine. In order to increase the compression of a gasoline engine to run on gas a compression plate is fastened to the head of the piston, decreasing the compression space. This makes the compression so high for gasoline that it causes pre-ignition and pounding in the cylinder.

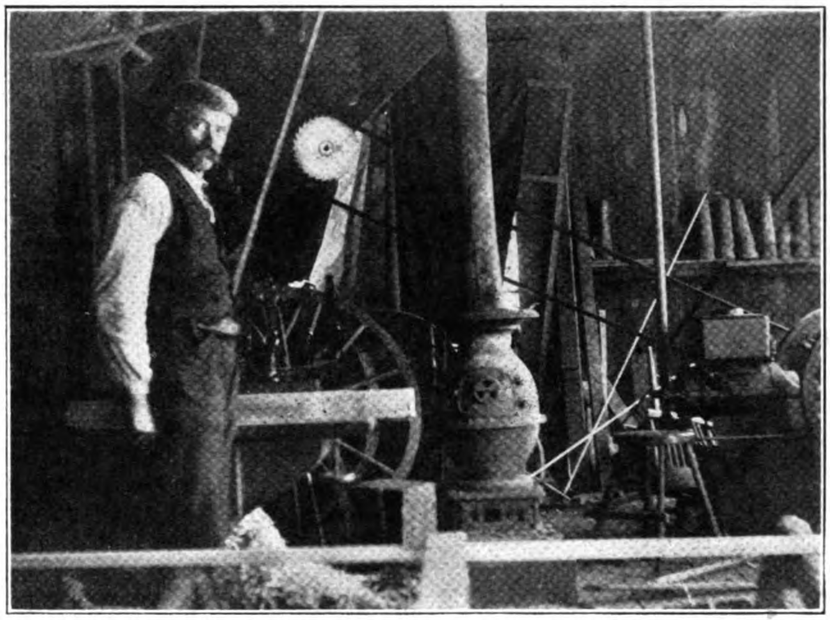
Engines with a large bore carrying a heavy load on early spark will cause pounding in the cylinder. This can be done away with by turning water into the cylinder through a needle valve the same as the gasoline needle valve. Too much water turned into the cylinder will decrease the power. The right amount, just enough to take out the pounding, will increase the power.

Large size engines are equipped with a compression relief so they can be easily turned over by hand. This is accomplished by having an extra cam to hold the exhaust valve open for a short time on the compression stroke.

A weak compression many times can be remedied by snapping the valves to clean off their seats.

Explosions through the intake pipe are caused by too weak a mixture. If this occurs more than once, give the engine more gas to prevent further loss in power. Explosions in the exhaust pipe are caused by too rich a mixture, and to remedy this turn off a little gas.

Best results are obtained by having the cooling water at 130° F. for gasoline, 200° F. for kerosene and 80° for gas. Too high a temperature will cause sediment to form in the water jacket and burn the lubricating oil.



THE WOODWORKING CORNER OF MR. S. H. COBB'S MISSOURI SHOP, OPERATED BY A FIVE HORSEPOWER ENGINE

On engines of the evaporator cylinder type, boiling water is no objection so long as the steam has a chance to excape. Thermo-syphon cooling system is that in which the water circulates in its natural state. The water inlet being below the outlet, the hot water seeks the upper opening and back into the tank or radiator. With this system care must be taken to be certain that there is enough water in the system to keep the top opening submerged. This system is used on most stationary engines and some automobiles.

The most favorable system is that equipped with a circulation pump.

When the cylinder fills up with lubricating oil and burns, it makes the engine more difficult to start and causes an unnecessary amount of carbon to form in the combustion chamber.

Lubrication by having the lubricating oil mix with the charge has proved a greater success with two-cycle engines than with the four-cycle.

Horse power of an internal combustion engine is rated from the output and not by the input, as is the case with the steam engine. For example, a 25 h. p. gas engine must deliver 25 h. p. at the flywheel to be a 25 h. p. engine; while a 25 h. p. steam engine must develop 25 h. p. in the cylinder. In order to develop 25 h. p. at the flywheel about 32 h. p. is developed in the cylinder of a gas engine. This shows a mechanical efficiency of $\frac{25}{32} \times 100 = 78.2\%$, or a friction loss of 7 h. p. With a steam engine, 25 h. p. developed in the cylinder would show 24 h. p. at the flywheel. A mechanical efficiency of $\frac{24}{25} \times 100 = 96\%$, or a friction loss of 1 h. p. This can be held as only a small advantage of the steam engine over the gas engine. The gas engine gains efficiency over the steam engine in that the thermal efficiency is higher in the gas.

The friction horse power of a two-cycle gas engine is lower than for a four-cycle, due to the fact that an impulse is taken once in one revolution for a two-cycle and only once in two revolutions for a four-cycle. With a steam engine an impulse is taken four times in one revolution. This only applies to the single-cylinder, single-acting gas engine compared with the single-cylinder, double-acting steam engine.

The Gas Tractor and What It Will Do

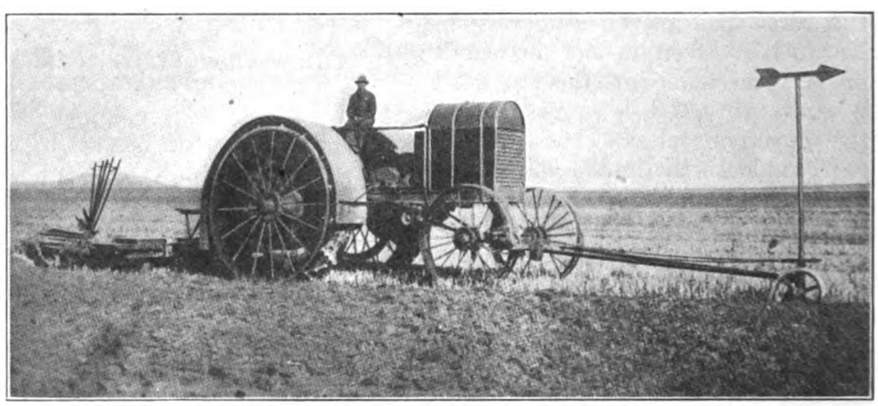
The gas traction engine has been doing its work satisfactorily for some little time, and it is being used more and more largely on farms from 200 acres up. That the use of the gas tractor will affect the business of the blacksmith in farming sections goes without saying, and it is decidedly up to the country smith to learn something about these machines. The smith's knowledge of gas engine power, gained in operating his own power plant, will, of course, aid him in no small degree to care for the gas tractor, while his natural mechanical ability will aid him with the operating mechanism of this machine.

And, while on the subject of gas tractors, the letter of an Iowa farmer to an agricultural paper will be of considerable interest in showing what the gas tractor must do to be profitable to the farmer, and what it really does do, as demonstrated by this writer:

"There are a large number of farms in every State where a traction engine would be a good investment. Only a few of these farm owners have made that investment. But no man wants to buy a traction engine unless he has pretty thoroughly assured himself that the money spent in that way will bring him larger returns than if he spent it in any other way for farm power.

"In order to do this, the engine must reduce the expense of operating this farm without reducing its income. A good engine will do this on a general purpose or grain farm of 400 acres or more. Small engines are being developed which will do it on farms as small as 160 to 200 acres. In order to be a paying investment, this engine must reduce the number of horses needed to three or four, at the most. It must not only do their work, but do it quicker, better and cheaper than it can be done with horses, and must do it without the need of as many men as are required when working with horses. It must not only do this one year, but it must do it for a number of years. The fuel, the lubricating oil and the repairs of that engine must cost less than the feed, doctor bills, shoeing and harness repair bills would be for the number of horses that would be required if one didn't own the engine. It must be such an engine as will do the work of the entire farm with one or more men less than are needed under present conditions.

"There are a number of good points which I see in an engine after two years' experience with one. For instance, with my engine I can disk my ground, drill and harrow in my grain all at once. I start across a corn stalk field in the spring; when I get to the other end, a strip of ground has been double disked, drilled and harrowed. I don't have to worry and more about that piece of ground. The grain is in the ground and ready to grow. If I am plowing that ground to be seeded or planted that same season, I can plow it, disk it and harrow it all at once, and the ground is then in ideal condition. It has been worked while it was fresh and moist, and there are no clods. Two men with my engine will do as much as four, five or six men with horses. When I am seeding, they will do as much work as seven.



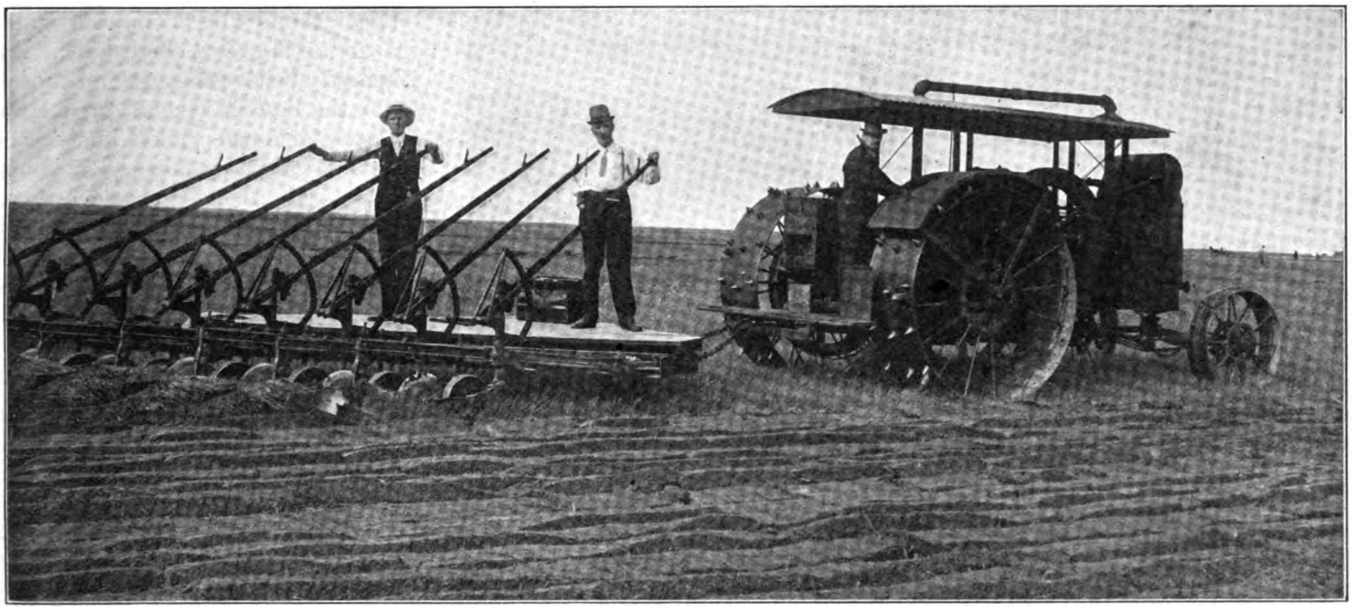
"TWO MEN WITH MY ENGINE WILL DO AS MUCH AS FOUR TO SIX MEN WITH HORSES"

"Another thing, if there is a rush season, if the weather has been backward, I can work the engine day and night. You can't do that with your horses. If your conscience will permit, you can do it seven days in the week, but when you are using horses, there is something more than your conscience to stop you.

"In the past two years I have averaged two hundred or more days' use from my engine each year. That is right here in Floyd County, Iowa. This modern farm horse of mine plow it with mold boards. Had I used mold boards, they would have caked the ground, so that it would not have recovered from injury for years.

"The number of things that can be done on a farm with an engine depends on two things: The farm and the man. A general purpose farm in the older sections of the country offers a wider range of usefulness to an engine than the single general purpose farms of the West. This is because there is a larger swaths into each windrow. My hay racks are made 9 feet wide and 20 feet long. The engine hitched onto one of these racks, with the loader on behind, will pick up that windrow at high speed. The speed need not be slackened from the time one starts up until the load is on and delivered at the barn, except an instant to unhitch the loader. I find that my cylinder loader stands the work very well and that in this way the work is done cheaper than with horses.

"As mentioned before, the things



"IN THE PAST TWO YEARS I HAVE AVERAGED TWO HUNDRED OR MORE DAYS' USE FROM MY ENGINE EACH YEAR"

does the majority of the things on my farm that my neighbors do with their horses. I use it to plow, to disk, to drill and harrow at the same time, to harvest, thresh, haul loads on the road, haul manure, haul the hay loader, build roads, drag roads, fill tile ditches and all such things as that. And this is on a general purpose farm in Iowa.

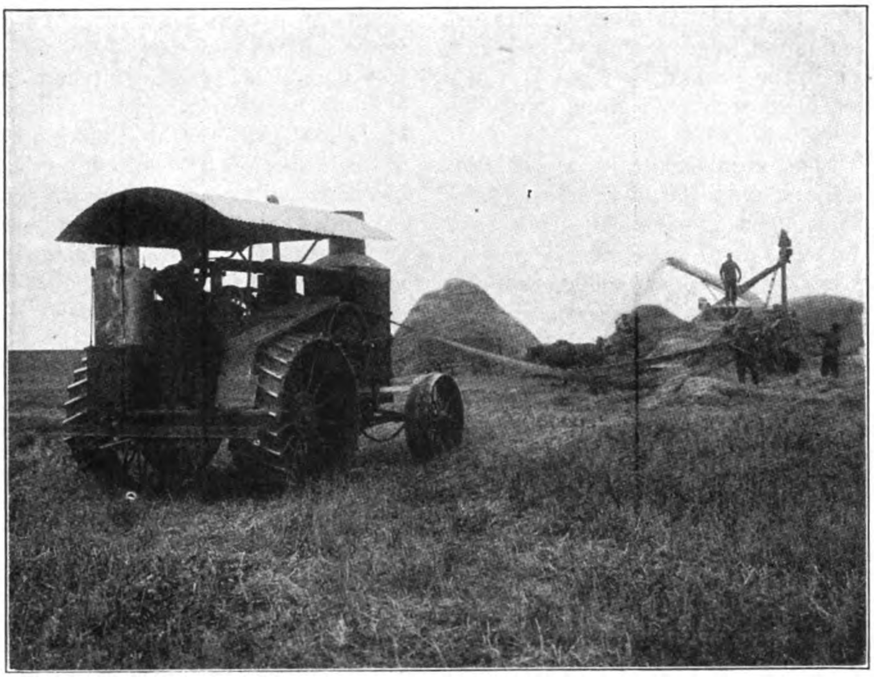
"My farm always has been known as one of the wettest in the county. It is one that has never before been all worked because too wet. The soil is a heavy black loam. I can go onto any of my fields and do the work with my engine when the ground is in fit condition to be worked with anything. I have disked with it in the spring, when the ground was so wet the disks threw up great chunks, so that I had to haul harrows behind them in order to keep the ground from clodding. I have plowed twenty-five acres eight inches deep in one day with disk plows when the ground was so wet I would not have dared variety of things to be done that require power. Because of this, the season of usefulness for an engine in this section of the country extends over the entire season open for field work. If the snow does not get too deep for moving around, much manure hauling and other such work can be done in the winter months very successfully.

"On one of my farms I am using a 30 b. h. p. engine. It has two speeds —two and one half and four miles an hour. I find this is very successful for hauling manure spreaders. It will haul them to and from the fields, and even when spreading their loads at high speed. With two spreaders and three men, one to do the hauling and two to do the loading, this work can be done much cheaper and faster with this engine than with horses.

"When one uses a hay loader in putting up hay, this engine is also very useful and cheap. I used a side delivery rake to rake my hay into long windrows, putting five mower for which an engine can be used depend a great deal on the man. If one is wide awake and resourceful, not hopelessly buried in a rut, but can see some little merit in new things and new methods and is willing to try, he will find many things at which to use his engine. He will also be thinking out ways of increasing the efficiency of it and decreasing the expense of using it. Thinking how he can do his work better, quicker and with less labor; how he can do two or three things at once, instead of only one.

"Possibly I had best call attention to one thing that may save some misunderstanding and some failures. The ordinary threshing engine will not prove successful at all things which I have mentioned. Most manufacturers build two types of engines; one is called a threshing engine, the other a plowing engine.

"They are gradually discontinuing the threshing engine. Its gears are built only to enable the engine



"THE PLOW ENGINE IS ALSO SUCCESSFUL FOR BELT WORK, SUCH AS THRESHING, SHELLING AND SHREDDING"

to take itself and the separator from one job to another over roads. The gears and wheels are not built strong and heavy enough to withstand the hard work and the heavy strains necessary in doing general field work under all sorts of soil and road conditions.

"The plow engine is built specially for the hard, trying service of general field and road work. They are also just as successful for belt work, such as threshing, shredding and shelling, as are the threshing engines."

An Ornamental Piece From Scrap

F. P. Schaaf

The engraving shows a piece of ornamental ironwork, the outfit totaling one hundred and twenty pieces, and almost entirely made of scrap pieces. This will show what can be done with odd pieces. To explain the different parts, will start at the bottom: The foot piece represents a three-leaf clover. The upright or stand part is made from ¼ round iron. The cage in the center is composed of twenty-five pieces and contains in the center of it a flower pot with a representation of an Easter lily in bloom, one lily bud, two leaves and an acorn center at the top of cage. This part was all welded together before putting the cage in the middle of the stand. The handles are made from small pieces of wire twisted to form handles. The parrot and the coal bucket are made of copper and are soldered on the top.

Two Views On Cold Setters

Favors Hot Setting

U. S. Hardten

I am very much interested in the discussions about tire setting. It seems that the cold setter and the hot setter smith each knows all about the business. Nevertheless, I would like to add my little experience. I find by setting tires hot you can set everything that comes along and do a reasonably good job. As has been stated, so many spokes need wedging up, and you have to take off the tire anyway and then by setting them hot you get an even draw all around the wheel. Some cold tire smiths say that if a tire is very loose, "I shrink it in several places", inferring that by so doing they can give it an even draw all around. Well, you come nearer doing so that way than shrinking it in one place. But most cold work is done by shrinking tires in one or two places, and anyone with good sound reasoning would know that it is a difficult matter to slip or draw a tire on a wood rim with a bolt every few inches. Then, too, you tighten your tire more at the shrink than at any other place on the wheel. Now, I have a cold tire setter and three hot setters. At first, when the cold process was a new thing, quite a few of my customers insisted on their tires being set cold. In the first place I believe a cold setter costs too much money. Mine did. By the time it paid for itself it was about ready for the junk pile. There are two points in favor of the cold setter. First; should a customer have a new wheel with the tire a little loose and did not want the paint marred he could get it tightened by the use of a cold setter. Second; on good sound wheels you can tighten the tire up in pretty good shape. But I honestly believe that the hot process is far the best in general, or if I was to have but one shrinker in the shop I would want a hot one. Of course it is all right to have a cold setter if you can afford it, as there are some wheels you can do a pretty good job on, as stated above.

Favors Cold Setting

B. H. Osterhoudt

As cold tire setting is of absorbing interest to the craft at this time I wish to add a few words in favor of this method. I have read the many articles condemning the cold setter, and often wonder if the writers thereof ever owned one of these machines or simply belonged to the great army of "knockers" that never advance in their trade beyond being the possessor of a few antiquated tools. It seems to me that every enterprising mechanic should delight in a machine or tool that would help make more dollars and lessen their labor, enabling them to get out their work better and faster. Eleven years ago I bought a cold tire setter and set 1500 tires the first season. In one month it paid for itself and left me a profit. The other shops condemned my machine. The result is that now there are only four shops in town where before there were seven.

I have a modern shop, 26 by 60, with cement floor, built on the plan of a factory with light and ventilation above and a solid panel of windows around the entire building. I also have a beautiful five-room cottage on the same lot and all paid for out of the money I have earned in my shop—and the cold tire setting has played no small part in making this possible. Of all the tools in my shop

I think the most of my tire setters, of which I own two, a Henderson and a Mayer's. Whether the tires are smaller than the wheels or not, they stay, and contrary to Brother Hobbs' prediction my customers do come back. Arguments for and against real labor saving inventions arise in nearly every scientific stage of advancement. I would like to hear from other defenders of the cold tire setter, the most useful machine yet offered to the blacksmithing trade, with the exception of the gasoline engine which I place above them all.

How To Do Babbitting

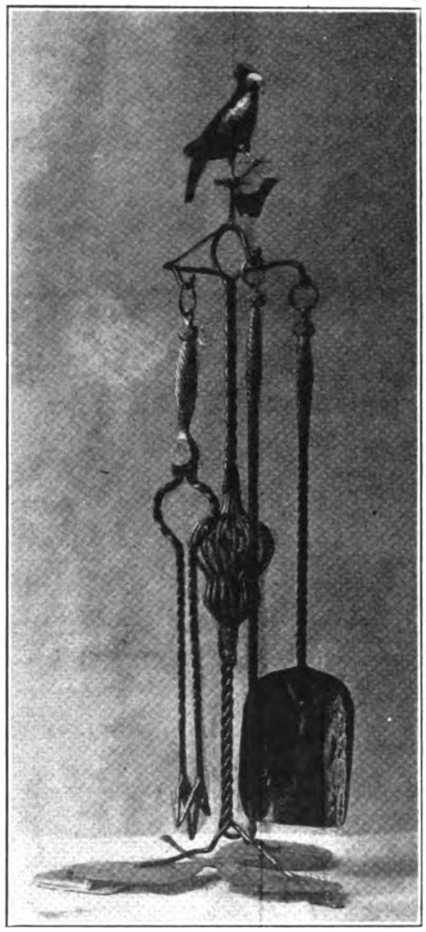
A. L. Ericson

The problem is to babbit a 2¾ by 14-inch solid box. The way I would do a job of this kind would be to make a wooden pin, 2⅝ by 16 inches, and center that in the box, first having heated the box quite hot so that as the babbitt would shrink first the box would shrink onto the babbitt and make the babbitt tight in the box. I would then place the box in a lathe and bore the babbitt out to 2¾ inches, so as to make a nice fit on the shaft. If I had no lathe on the job, I would wrap four thicknesses of very soft newspaper around the shaft, and just as soon as the babbitt was all poured in I would have a man ready to turn the shaft in the box before the babbitt would have time to grip onto the shaft. In this way there would be no trouble to get the shaft loose from the box. A good way to treat a small shaft when one runs a solid box is to hold the shaft over a kerosene lamp and smoke the shaft thoroughly before pouring the babbitt. In that way no paper wrapping is needed and one will get a better fit, but when the job is done in that way the shaft must not have any grooves or ridges in it.

Doing Repainting in the Jobbing Shop

W. A. Riggleman

First of all, one should have a big, clean shop with plenty of light and an entrance that is handy for bringing in and taking out the work. This is absolutely necessary for automobile work especially. This is, therefore, the time of year to fix up your old shop if you expect to stay in the business, and after the shop is in good condition by all means raise the prices of repainting. If you have no painter as yet for next season or year, get in touch with one and try to employ him for a year, and see that there is enough work to keep him busy. Secondly, look around for some good stock for next season's work. If what you had before did not prove good, why, try another brand or make. Get good varnishes and colors, leads, etc., good brushes and stock of all kinds. And if you give your painter good wages your troubles are about over in the paint shop.



SCRAP IS NOT ALWAYS ENTIRELY WASTE MATERIAL

If you are doing nothing but repainting old work, why, do it well and you will always have plenty of work. The following is one of the best ways to repaint an old vehicle or automobile of any kind. Most all the jobs nowadays get painted but once and you will find them in good shape, and I think automobiles will be the same. The reason for this is—they buy new ones to keep up with the style. This is a good thing for the builder but not for the repair man or the repainter.

Do not burn your body off for it will not need it. You cannot do it for the price you receive, anyhow. Give the same a good quick-drying coat of lead or the new system first coat. Then, when this coat is dry, glaze or putty the same all over. When the putty is dry, sandpaper it well and coat with your filler or roughstuff, giving it four coats. When the roughstuff is dry, rub down with sandpaper, lightly.

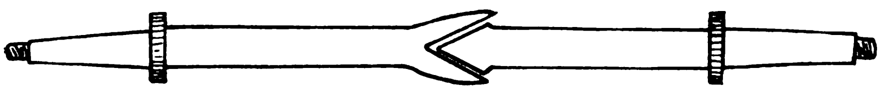
You can start here with the old or the new way, and I will give both for your information. The old way is to put a coat of color on your rubbed down body, lamp-black or drop black and, when the color is dry, give the same a coat of regular color varnish. If it is to be a good job of painting moss this coat or rub, lightly, giving the body a coat of half black running and half clear rubbing. When this coat is dry, rub and finish. One of the best varnishes for finishing old bodies is Valentine's one-coat coach. It drys quickly and the work can leave the shop in short order after the job is completed. It is also a good gear varnish. There are, however, cheaper varnishes that will give fair results.

The new system or the up-to-date way to do the work is to take your body after it is rubbed out of roughstuff and sandpapered and give it a coat of solid covering color varnish. Moss the coat when dry and give another coat of half black running and half clear rubbing. Be sure that they are both made to dry the same. This is for a first-class job. If a cheap class of work, rub the solid covering color varnish and finish.

For the gears or chassis or whatever kind of gears you are painting, clean the gears well and give them a good sandpapering. File and scrape all scaled places, lead the bare spots and rims the first day. Putty the runs and holes and, when this is dry, sandpaper and give the gear a coat of dead lead mixed with keg white lead, a little dry lamp black and a little japan and oil. Mix well and thin with turpentine for use. When dry, moss or hair off the work. The old way was to give your gears a coat of color (the color you wished the gear) and when this coat was dry to give the same a coat of color varnish and, finally, stripe and finish. Do not give the gears a coat of clear rubbing unless you get well paid for it. The up-to-date method is to

take your gears after mossed or haired out of your dead lead and give them a coat of solid covering color varnish. When dry, stripe and finish. You can easily see the stock and time you save in this way. A great many of the varnish manufacturers make this solid covering color varnish. Be sure, however, to get a kind that will cover over any shade of lead, as this saves you time and stock, and that is what we are looking for.

The above method makes a fine looking job and one that will stand.



THE TROUBLE IS CAUSED BY DRIVING THE HEAT TOO FAST

Never start an old carriage, buggy or automobile with the old oil lead system if you expect to finish it quickly. Any old body or gear has all the oil in the wood it needs, for it receives enough when first painted.

Here is a good way to do an old body with old varnish and paint on the same. Just give it a coat of good pale japan or black rubbing varnish or the solid covering color varnish and, when this is dry, give it a coat of rough stuff. When this coat is dry, putty or glaze, sandpaper a little and go ahead with your roughstuff.

Owing to the low prices which customers wish to pay at this time and at the same time have them look well and smooth you have got to figure your costs closely if you wish to make any profit.

How To Form Bosses On Flat Stock

BERT HILLYER

In forging bosses on flat iron, one way is to make a ring, the inside of which is to be the same diameter as the outside of the boss. The iron is heated up and the ring is placed on top in the place where the boss is to be. It is then driven into the metal to the required depth. This leaves a circular fuller-like mark. The metal on each side is then drawn down to size, leaving a nice round boss with a fillet at the bottom.

Sometimes these bosses are put on so as to make a good bearing for a pin or a stud, and at other times they are necessary in order to make a lever clear rivet heads or other obstruction. It is for the latter kind that I am going to show a quick, easy way:

First it is necessary to have a ring made of round iron the same as was mentioned in the first method. Then make a ball that is a little larger than the ring in diameter. Now, for instance, say we are going to make a band to go on an iron tank or box, the band to be made out of ⅝-inch by 4-inch soft steel, with two bosses on it, 3 inches in diameter and ½ inch high, 4 feet apart from centers, the whole band requiring 8 feet to make it. Starting, we heat the piece 2 feet back from the end. When hot, strike it a few blows on the end to upset it a little. This can be done while it is in the fire. Then lay the stock on top of the ring and place the ball directly over the center. Now drive the ball down. This leaves a round bulge. The top of bulge is then driven back, leaving a flat surface on top of the bulge. This is all done in one heat and looks neat. The other hub is marked off 4 feet and done the same way. The whole band being completed in less than one fourth the time than if it had been made solid or welded and for the clearance of rivet heads, etc., this answers just as well.

How To Weld Steel Axles

H. E. BERGER

First get the length required; jump up each to allow for working; split one end according to the size of your axle and open it up in the shape of a V as shown in the engraving. Cut the other end to a point, place V-piece in fire until at a red heat. Now place joints together and place in the fire, covering well with coal. Now blow slowly until your stock is heated thoroughly. As your heat comes, increase the blast. Now use a wooden mallet and drive on the end of the spindle, driving joint together. in the fire. When you have a white heat and before the sparks begin to fly take the pieces from fire to the anvil, give two light strokes at first and then come on to it and weld it down with one heat. If this is done right you cannot see where it is welded.

The great trouble with smiths in welding steel of all kinds is in driving the heat too fast; they get a good outside heat while the inside stock has not come to a welding heat. You will find that you can use the same method in welding heavy tires.

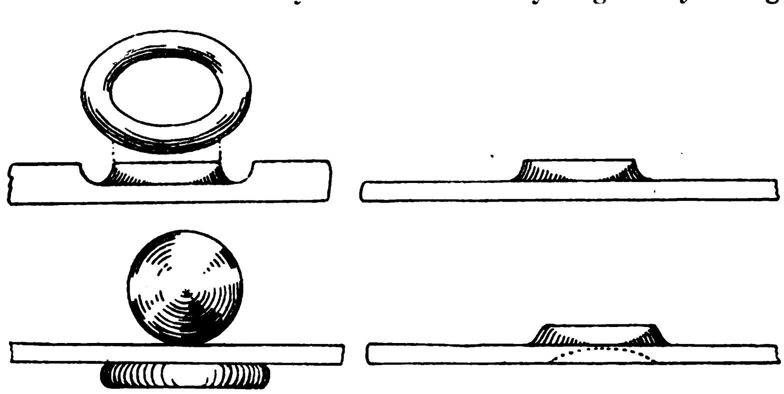
Horseshoeing and Tire Setting in England

R. HOLLINGSWORTH

We make our own shoes, and as some of the railway and brewery horses weigh a ton and over we make some shoes that weigh from four to five pounds each. I think if Mr. Briggs of Texas was to try his hand at one of these horses he might easily spend five minutes and a few seconds in pulling the first shoe off; but, of course, he would have to pick his horses.

We are also interested in the different opinions on tire setting, (this we call hooping). Each man has his reasons, and some of them are very good ones, for his own particular method. Now I cannot argue the point about cold tire setting, as I have never seen one work, but I know that there are many in this country, especially in the big shops where they specialize in wheel making. Now I will tell you how we do hooping:

In the first place we never get any very light tires. I have never known anything nearly as light as

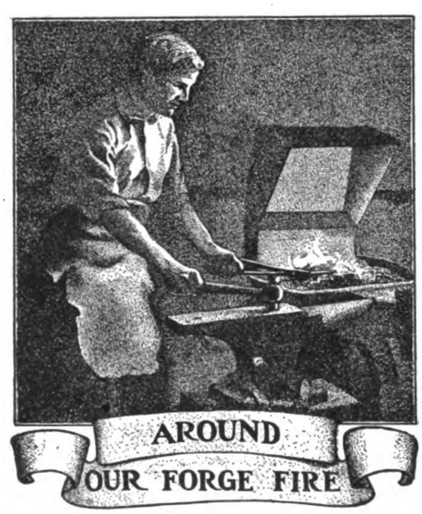


BOSSES ARE EASILY AND QUICKLY FORMED WHEN YOU KNOW HOW

THE INTERIOR OF AN ENGLISH SMITHY WHERE GENERAL WORK IS DONE

the delivery wagon type as shown in the current number. Our ordinary tradesman's delivery carts and wagons all have at least 1¾ and 2-inch by ⅝-inch tires on. The strongest tires we put on are 4 and 4½ inches by ¾ inch up to 4 feet, 8 inches in diameter. We always have to cut the old tires off, and if the wheels want repairing the wheelwright sees to them. Our smiths here never touch the woodwork. After the wheel has been attended to, we note the condition—whether all the spokes fit tight in the hub and if all the felloes bear evenly on the shoulders and what joint room there is. We then weld the tire accordingly. Suppose it to be 4 by ¾ inch, it would be given 1 inch to 1¼ inches—that is to say less than the wheel; a 2 by ⅝-inch tire would be given ⅞ to 1 inch. We always heat our tires on the ground with wood, about six or eight at one time. The wheels are screwed down on a tiring platform through the hub, and the tires dropped over and knocked down to the face plate, then slacked off. It never dishes any but very old wheels, and there is no shifting of the tires when once they are cold.

We don't repair many agricultural implements here, as it is a colliery and manufacturing district where they make earthenware, pipes, bricks, sanitary pottery and the famous Bretby Art Pottery. I am enclosing photograph of our shop with father at the anvil. Our shop is twenty-four feet square, with another one of the same size for iron stores, one for lumber and a smaller one for shoeing. We have no power in the shop, but we have two forges with circular double blast bellows and water tuyere irons and a good stock of modern tools, including two drilling machines, one duplex punch, several different pattern stocks and dies and all kinds of pipe tongs.



"Well, what's new, Benton?" asked the Editor swinging about in his chair to greet the "man of recipes."

"Nothing much. I've come across several new things; perhaps the most interesting is a new soldering acid." And Benton took possession of his favorite chair, lit a cigar and pulled out his recipe book. "I was down to see Jack Bryant at the General Metalware plant the other day and—"

"What do they make?" interrupted the Editor.

"Why, they make cooking utensils, roasting pans, coffee pots and a big line of cans and metal containers for tea, coffee, spices and similar materials. Jack Bryant is at the head of the assembling department, and of course they do an immense amount of soldering in making up their sheet metal goods. He says he discovered a new and very superior soldering fluid, and while considerable fussing is necessary to make it up, it is worth the time and trouble. He told me how it was made up. If you want it I'll give it to you just as he gave it to me," concluded Benton, turning the pages of his note book.

"Let us have it" returned the Editor. "It will no doubt be of considerable value to some of our readers. If the quantity is too large, one can no doubt use the same proportions for a smaller quantity."

"Yes, I think a small amount could be prepared in the same proportion." And Benton then read the following from his note book:

"To make one gallon of this soldering fluid take three quarts of common muriatic acid and allow it to dissolve as much zinc as it will take up. This method, of course, is the usual one followed in the manufacture of ordinary soldering acid. The acid, as is well known, must be placed in an earthenware or glass vessel. The zinc may be sheet clippings or common plate spelter broken into small pieces. Place the acid in the vessel and add the zinc in small portions, so as to prevent the whole from boiling over. When all the zinc has been added and the action has stopped it indicates that enough has been taken up. Care must be taken, however, to see that there is a little zinc left in the bottom, as otherwise the acid will be in excess. The idea is to have the acid take up as much zinc as it will.

"After this has been done there will remain some residue in the form of a black precipitate. This is the lead which all zinc contains and which is not dissolved by the muriatic acid. This lead may be removed by filtering through a funnel in the bottom of which there is a little absorbent cotton, or the solution may be allowed to remain over night until the lead has settled and the clear solution can then be poured off. This lead precipitate is not particularly injurious to the soldering fluid, but it is better to get rid of it, so that a good, clear solution may be obtained.

"Now dissolve six ounces of sal-ammoniac in a pint of warm water. In another pint dissolve four ounces of chloride of tin. The chloride of tin solution will usually be cloudy, but this will not matter. Now mix the three solutions together. The solution will be slightly cloudy when the three have been mixed, and the addition of a few drops of muriatic acid will render it perfectly clear. Do not add any more acid than is necessary to do this, as the solution would then contain too much of this ingredient and the results would be injurious.

"This soldering acid is used in the same manner as any solution of this kind, but it will be found that it will not spatter when the iron is applied to it. It has also been found that a poorer grade of solder may be used with it than with the usual soldering acid. A solder composed of two parts of lead and one of tin works equally as well and produces fully as strong a joint as that obtained with the customary half and half solder."

"That" added Benton, "is how the fluid is made."

"Rather complicated and fussy process, but I suppose it is very good." And the Editor turned to give his attention to the proofs from the printery.

Discouraged

Judd Mortimer Lewis
(in *Harper's Weekly*)

Th' world is a-goin' too rapid fer me
An' Dobbin, we're old an' we feel it; why we
Air as much out o' place on th' roads o' today
As a live diplodocus er mummy, an' they
Hev been, so they tell us, distinct fer so long
Thet no one now livin' has seen one; it's wrong
Fer to stand in th' way blockin' progress, I s'pose,
So it's time me an' Dobbin had turned up our toes.

I kin recollect th' first auto that whizzed
Past my cart in th' road, how it sputtered an' sizzed.
An' that's about all thet I seen, if 'twas me
Er Dobbin scared worst I don't know; there's a tree,
As ye go 'round th' bend t'other side o' th' hill,
With a broken branch on it, I hung there until
I was helped by a neighbor, too flustered to speak,
An' Dobbin—he didn't git home fer a week.

Then autos got common an' sassy an' gay,
Th' smell o' one couldn't blow out o' th' way
'Fore another would chug into sight; then, when I
Was watchin' a bunch of them once goin' by
Th' chaps runnin' of 'em looked up in th' air,
An' I looked, an' Dobbin, an' blame me if there
Wa'n't a flyin' machine goin' smooth as ye please!
An th' autos jumped ditches an' tried to climb trees!

An' Dobbin—he tried to crawl under th' barn,
But I beat him to it, 'n' all I said was: "Darn!"
When autos come, people said horses must go,
But I didn't think it; but nowadays, though,
I do; so does Dobbin, he wants to go! He
Is scared of a shadow, an' thet describes me!
I'm old—an' I'm done!—I would let go th' reins
'Fore somethin' comes on thet'll scare aeroplanes.

Ever hear of a man rising by calling others down?

Customers just enjoy coming into the shop of the happy, cheerful smith.

It's the man who is really bigger than his job who gets a bigger job.

What relation are the prophets of smithing to the profits of smithing?

Some smiths find it easier to hold a fractious horse than to hold a fractious tongue.

A man without enemies is of small account. If you haven't any, make a few.

We have machines for setting tires, but none for setting good examples.

Why make a mistake, if it teach you nothing?

Ask us to head a herd your way, if your supply of Buffaloes is low. A postal will do.

No changes in tool dressing styles are reported for the coming year.

Just after the policy has lapsed is the usual time for the fire. Keep a sharp eye on the date of your insurance contract.

Is the trouble with the man or the trade when a smith says he is sorry he ever became a blacksmith?

The average man feels that the world doesn't understand him and perhaps it is well that it doesn't.

A horseshoer will never rise very high by calling down a horse that will not stand still.

Actual use will not wear out tools any quicker than lack of care. It pays to look after the equipment properly.

The failure of many a business is caused by inattention to collection. Better keep on the heels of your debtors.

When you lose your temper you also lose trade. It is not so much the length of a man's life as it is the breadth of it.

Of the man who does not read a craft journal, ask how he would know that electric drills were made for smith shop use if it were not for the craft papers.

It won't take you long to write a short item for publication in these columns. Better begin the year right by writing something for your brother craftsmen.

It's not so much the making of mistakes. Everyone makes mistakes, but it is the repeating of them that places us in the wise or foolish class.

You're not supposed to know all about your new machines the minute they come into the shop. The manufacturers will gladly help you when you don't understand things.

Cut prices, certainly, if you feel that your end of the selling price is too big. But, remember, it's the profit, not the cost end, that you cut. Cutting expenses increases profits.

"Hardly worth while t' open shop," says Tom. "It's so cold, all yer profits go into the heater t' keep the shop warm." Of course, Friend Tardy doesn't believe in working to keep warm.

Only by adding new customers can your profits grow and your business increase. Those who never hear of you or your shop never can trade with you. Advertise and keep at it—that's the solution.

A new name heads the Honor Roll—and he's located in Manitoba, too. Mr. Turner's subscription is paid up to October, 1923. You, too, can save a neat sum by taking advantage of our long-time rates.

You wouldn't attempt to run a race blindfolded. Yet, some smiths run their business without regard to running expenses and costs—and then they wonder why they don't win.

When you let a bill run so long that the customer gets behind, then you get behind; and unless the customer catches up, you are likely to stay behind. Better keep at debtors all the time.

One of the largest contracts for print paper has been given by a New York daily to a New York State paper mill. The contract calls for delivery of 157 tons of paper daily.

Keep your fingers on the pulse of your customer's wants. Ever think to apply the same line of reasoning as the bootblack uses? He usually announces his wares when he sees there is need of his services.

Which is your method? Do you fit the shoe to the foot or the foot to the shoe? Better put the foot in the best possible shape first and then fit the shoe exactly to the foot.

Your granddaddy, no doubt, used the most approved methods and tools of his time. Don't use old-time tools for old-time's sake. Do as your grandfather did—use the best methods and tools of your time.

There is no more honest toiler than the forger. Also, there are few lawbreakers worse than the forger. It's simply a difference in the material forged. Better a humble forger of metal than a rich forger of paper.

It's poor business to feed the profits of one department or branch of your business to keep another fat. Keep careful account of every department and know where you stand. This will prevent a fattening of one department at the expense of another.

An already large hardware organization, the Simmons Hardware Company, St. Louis, has added an air machine department. They are handling the Benoist biplane, which is manufactured in their own city. They report that many inquiries have already been received for this machine.

We'll want lots of good pictures of good shops for the coming shop number. If you've got a good shop and have a good picture of it, send the picture in. The shop number for 1912 is going to be just the finest shop issue we have ever issued. Will you help us?

The smith's lot is lots easier these days. No excuse for not having modern machines in your shop; and, if you use electric current, or can get it, you'll want electric equipment. Just look through this issue of "Our Journal" and notice the many electrical machines you can place in the smith shop.

When the business problem seems complex, when there appears to be no solution or apparently no light on the matter, sit right down and study the situation. Analyze the proposition from the beginning; study the why and the wherefore intelligently. Chances are you will not be long in seeing light and in getting at a solution. Try it out along this line the next time—you'll get along easier and quicker in arriving at your goal.

Some changes are bound to take place in the smithing craft during the next ten years. Despite the opposition of the horse-drawn vehicle makers, motor transportation will increase. The gas tractor is already taking the place of the horse on many farms, and the farmer will continue to employ power more and more each year. What changes will this evolution make in the smithing trade? Let us look forward across the years and compare the pictures in our minds. What do you think the smith shop of ten years from now will look like?

The owner of the fast pacing mare, Blanche, Mr. Lou Charles of Spokane, Washington, says that she is at once to be supplied with a set of false teeth to cost $3,000. The mare has won $10,000 for her owner this season on Western turfs and has been much troubled with toothache. The mare ran away on the North Yakima track, bumping into a fence when attempt was made to stop her. This caused injuries to her teeth which made her suffer for several months. Mr. Charles says he can fritter away one third of that $10,000 on new teeth for her.

Our Honor Roll

New Name Heads List

List Limited to This Page

Another change in leadership of Honor Roll—Mr. W. R. Turner of Manitoba, Canada, is paid up to October, 1923, and Mr. Stites must take second place. Wonder how long Mr. Turner will hold first place. If you think of holding the leading position, better sharpen your pencil and do some figuring. It's getting more difficult each month to land in first place.

This list is limited to this page. We've reached the limit this month. When names are now added they will need to be well up toward 1916 or further advanced, for names will be taken from the end of the list as new ones are inserted.

	U. S. and Mexico	Canada	Other Countries.
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s

A paper with a list like this and with several thousands of other subscribers who have paid in advance to 1914, 1913 and 1912 must be valuable. Practical smiths don't pay for a paper in advance unless that paper is practical and worth real money. Ask your neighbor to subscribe—show him this list.

NAME	Subscription Paid to
W. R. Turner, Manitoba	Oct., 1923
I. J. Stites, New Jersey	Jan., 1923
W. Lawson, New Zealand	Nov., 1922
D. W. Smith, Rhode Island	Mar., 1922
O. M. Johnson, Minnesota	Oct., 1921
H. Feldus, Nebraska	Sept., 1921
W. K. Kline, Kansas	May, 1921
R. S. Crisler, Kentucky	Jan., 1920
I. M. Townsend, California	Apr., 1919
T. P. Considine, Massachusetts	Dec., 1918
Richard Brenner, Texas	Feb., 1918
W. F. Hill, North Carolina	Feb., 1918
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, North Dakota	Nov., 1917
H. Ferrel, Illinois	Aug., 1917
W. McCoy, Kansas	May, 1917
E. Thibaudeau, Wisconsin	April, 1917
J. N. Miles, Kentucky	April, 1917
J. M. Brown, Texas	April, 1917
J. S. Haskell, Colorado	Mar., 1917
W. L. Roark, Texas	Mar., 1917
A. Tillman, California	Feb., 1917
Walker Bros., New Zealand	Feb., 1917
G. W. Whittington, W. Virginia	Feb., 1917
H. Kahl, Iowa	Jan., 1917
J. H. Bergen, Kansas	Jan., 1917
Leonard Smith, New Jersey	Dec., 1916
C. F. Shaw, Manitoba	Dec., 1916
W. Elward, Pennsylvania	Dec., 1916
W. W. Egly, Pennsylvania	Dec., 1916
Jos. Boyer, Michigan	Dec., 1916
J. H. W. Schneider, California	Dec., 1916
W. Sauer, Minnesota	Dec., 1916
F. F. Darling, California	Dec., 1916
Chas. Newland, California	Dec., 1916
J. T. Brahm, Iowa	Dec., 1916
P. H. St. Louis, Wisconsin	Dec., 1916
A. E. Nickols, Oklahoma	Dec., 1916
C. J. Hall, Washington	Dec., 1916

NAME	Subscription Paid to
Bob Fricke, Alabama	Dec., 1916
Joeris Bros., Texas	Dec., 1916
R. Clemens, Connecticut	Dec., 1916
Scheffley & Schmitt, Penn	Dec., 1916
A. Brause, Ohio	Dec., 1916
J. E. Beatty, Missouri	Dec., 1916
F. N. Browning & Son, Ky	Nov., 1916
J. Macuab, Scotland	Nov., 1916
P. Gessen, Illinois	Nov., 1916
J. W. Gribble, S. Australia	Nov., 1916
W. G. Sim, New Zealand	Nov., 1916
H. V. Ruehl, Alabama	Nov., 1916
G. Lindborg, Indiana	Nov., 1916
Pittman Stell, North Carolina	Nov., 1916
J. S. Finkenbiner, Indiana	Nov., 1916
R. D. Wixom, New York	Nov., 1916
E. A. Knapp, New Zealand	Oct., 1916
T. J. Haskins, N. S. Wales	Oct., 1916
Lothian & Skinner, N. S. Wales	Oct., 1916
W. B. Knouff, Alabama	Oct., 1916
Gorham Bros., Iowa	Oct., 1916
W. H. F. Brauch, N. Carolina	Oct., 1916
Clark Olds & Co., Nebraska	Oct., 1916
Irwin Scott, New York	Oct., 1916
C. E. Durham, Kansas	Oct., 1916
James Poettgen & Co., Mo	Sept., 1916
Jno. Goetzinger, Iowa	Sept., 1916
Geo. Fleckenstein, California	Sept., 1916
Geo. Hill, Australia	Sept., 1916
E. C. Beard, Australia	Sept., 1916
J. K. Glinicki, Michigan	Sept., 1916
Oscar Buhner, Maryland	Sept., 1916
A. J. Hammond, California	Sept., 1916
Robert Murray, California	Sept., 1916
D. E. Wright, Pennsylvania	Sept., 1916
J. S. Haskell, Colorado	Sept., 1916
R. Sommer, Australia	Sept., 1916
J. A. Sequin, Canada	Aug., 1916
James Clarke, Jr., Australia	Aug., 1916
Dispatch Found'y Ltd., N. Z.	Aug., 1916
C. P. Robertson, South Africa	Aug., 1916
A. C. Lodwig, California	July, 1916
A. A. Bahlke, Michigan	July, 1916
J. K. Hansen, Australia	July, 1916
J. B. Barker, Illinois	July, 1916
H. M. Larsen, Wisconsin	July, 1916
Geo. P. MacIntyre, Maine	July, 1916
Jas. A. Buchner, Michigan	July, 1916
G. R. Harrison, Australia	June, 1916
J. Waycich, South Africa	June, 1916
W. Voight, South Africa	June, 1916
Martin Jensen, Wisconsin	June, 1916
Chester Humbert, Wisconsin	June, 1916
Lincoln Underhill, California	June, 1916
M. Broton, North Dakota	June, 1916
Hans Eriksen, Illinois	June, 1916
C. Morrell, New Brunswick	June, 1916
J. O. Conrad, Kansas	June, 1916
Adam Schmitt, Michigan	June, 1916
James Sinclair, West Australia	May, 1916
H. Baker, Australia	May, 1916
E. Q. Krehbiel, Kansas	May, 1916
C. H. Cairns, New York	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vermont	May, 1916
C. A. Stebbins, Kansas	May, 1916
Sanford Baker, Missouri	May, 1916
P. A. Peterson, Iowa	April, 1916
D. E. McDonald, Florida	April, 1916
James Baxter, South Africa	April, 1916
E. P. Dignan, South Australia	April, 1916
W. H. Winget, Vermont	April, 1916
A. Rockenschup & Son, La	Mar., 1916
C. H. Alexander, New York	Mar., 1916
A. M. Harebo, Wisconsin	Mar., 1916
George Howard, Kansas	Mar., 1916
G. N. Follmar, Nebraska	Mar., 1916
W. Willoughby, Michigan	Mar., 1916
H. Hoffmeyer, New Jersey	Mar., 1916
Frank L. Locke, New York	Mar., 1916
Frank L. Evarts, Connecticut	Mar., 1916
C. R. Winget, Vermont	Mar., 1916
Hugh & John Chisholm, N. Z.	Mar., 1916
C. F. Molkenten, Australia	Mar., 1916
H. D. Phillips, South Australia	Mar., 1916
F. J. Flessel, New York	Feb., 1916
E. P. Jones, Kansas	Feb., 1916
C. K. Cornelison, Pennsylvania	Feb., 1916

NAME	Subscription Paid to
E. J. Bishop, New York	Feb., 1916
Thomas Horne, Arizona	Jan., 1916
Charles Tucker, Michigan	Jan., 1916
M. Klitgord, New York	Jan., 1916
O. Stenning, South Dakota	Jan., 1916
Iver Johnson Arms and Cycle Works, Massachusetts	Jan., 1916
Feldmeyer & Schaake, Kansas	Jan., 1916
Geo. Sykes, Australia	Dec., 1915
W. Patrick, New York	Dec., 1915
Jas. A. Sharp, Massachusetts	Dec., 1915
J. Krahulec, Illinois	Dec., 1915
P. E. Dahlfurst, California	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Nebraska	Dec., 1915
G. S. Fisher, Nebraska	Dec., 1915
Printers Supply Company, Nebraska	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Virginia	Dec., 1915
C. J. Ash, Kansas	Dec., 1915
F. H. Joslin, Massachusetts	Dec., 1915
C. W. Ames, Massachusetts	Dec., 1915
C. L. Sorensen, Nebraska	Dec., 1915
E. Williams, New York	Dec., 1915
W. Urquhart, New Zealand	Dec., 1915
W. Rupe, Oklahoma	Dec., 1915
L. S. Kocher, Iowa	Dec., 1915
P. W. Frazer, New Zealand	Dec., 1915
D. Codere, Illinois	Nov., 1915
F. S. Woody, Iowa	Nov., 1915
George H. Ilsley, Massachusetts	Nov., 1915
M. I. Huff, Missouri	Nov., 1915
Stephen Wachter, Pennsylvania	Nov., 1915
C. J. Willard, Illinois	Nov., 1915
J. S. Lee, Washington	Nov., 1915
L. P. Mortensen, Michigan	Nov., 1915
N. W. Hammond, Colorado	Oct., 1915
P. G. Dairdson, N. Dakota	Oct., 1915
C. N. Mills, California	Oct., 1915
H. Dier, South Australia	Oct., 1915
S. B. Goodsell, Connecticut	Oct., 1915
D. F. Hallowell, Iowa	Oct., 1915
A. Roth, Illinois	Oct., 1915
C. C. Perry, Australia	Oct., 1915
Sidney Stevens Imp. Co., Utah	Oct., 1915
W. H. Findlay, New Zealand	Oct., 1915
R. F. Watson, California	Oct., 1915
H. R. Stone, Connecticut	Oct., 1915
F. Teuber, Georgia	Oct., 1915
Ed. Hammill, California	Sept., 1915
R. D. Simkins, Pennsylvania	Sept., 1915
T. J. Reynolds, Pennsylvania	Sept., 1915
Wm. Bates, Texas	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, West Virginia	Sept., 1915
Hugh L. Lynn, Kentucky	Sept., 1915
Advance Blacksmith Co., Mo	Aug., 1915
A. Chargois, Queensland, Aus	Aug., 1915
A. M. Byfield, West Australia	Aug., 1915
C. E. Allen, Nebraska	Aug., 1915
M. J. Roder, Montana	Aug., 1915
J. E. Lyon, Texas	Aug., 1915
F. W. Krenz, California	Aug., 1915
J. W. Storment, Illinois	Aug., 1915
Jos. P. Rotolinski, Massachusetts	Aug., 1915
G. N. Ferree, Utah	July, 1915
T. O. Chittenden, New Zealand	July, 1915
The Goldfields Diamond Drilling Company, Australia	July, 1915
J. A. Lawton & Sons, South Australia	July, 1915
I. Murray, South Australia	July, 1915
S. A. Stiles, Ohio	June, 1915
J. A. Berthelsen, N. S. Wales	June, 1915
J. W. Ivil, Utah	June, 1915
E. L. Herving, Florida	June, 1915
G. R. Twedell, Mississippi	June, 1915
O. Siebler, Texas	May, 1915
Schintgen & Maier, Minnesota	May, 1915
Van den Wildenberg Brothers, Wisconsin	Mar., 1915
V. Priessnitz, Wisconsin	Mar., 1915
F. J. Ties, Wisconsin	Mar., 1915
J. Marshall, Indiana	Mar., 1915
H. D. King, New Jersey	Mar., 1915
J. E. Johnson, Pennsylvania	Mar., 1915

Ten Questions For the Month

Steel and steel working is the subject of this month's questions. Of course, all readers are not interested in the more advanced stages of steel working, but one and all should be sufficiently interested to read the questions, guess (?) at the answers, and then next month see if you guessed correctly.

1.—What is temper as used by the steel maker?

2.—What is temper as used by the steel worker?

3.—What is the difference between hardening and tempering?

4.—What is the difference between annealing and tempering?

5.—Why should steel be annealed?

6.—What is a water crack?

7.—What is casehardening? How is it accomplished?

8.—How should long articles be dipped in the bath? Why?

9—How may a piece of steel be tested for hardness?

10—If a piece of steel has been heated a little too hot for hardening properly what should be done?

Let us know what you think of this department. We want an expression of opinion from every reader on how to make this feature larger and still more useful. We have several excellent ideas on file, but want to get a representative expression from readers and those interested. Have you told us what you think of this department?

Answers To Questions in January Issue

1.—From 4 to 6 ounces pressure to the square inch is the blast ordinarily used in a blacksmith's forge.

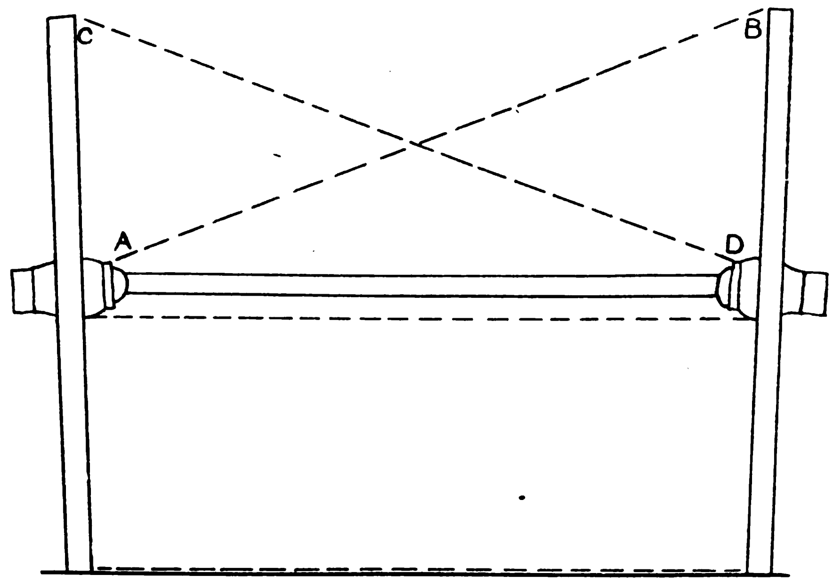
2.—The blower should be placed as near as possible to the forge, and the blast pipe should contain the least possible number of angles. The nearer the forge the less blast lost in transmission.

3.—The anvil face should be slightly crowned across the width. If it were perfectly flat, stock held on the anvil face would need to be held perfectly flat, for if not held so it would sting the hand. Stock would also have a tendency to turn up at the ends if the anvil face were perfectly flat.

4.—The anvil should be set so that when the smith who is to use it stands beside it his knuckles will just reach its face.

5.—The cold cutter has a curved cutting edge ground rather more blunt than the hot cutter. The hot cutter on the other hand has a thinner blade and a straight, sharp, cutting edge.

6.—A soapstone pencil is excellent, as its markings will not burn off.



HOW TO KNOW A WHEEL IS ON A PLUMB SPOKE

7.—Bituminous or soft coal when free from sulphur and phosphorus and of good quality is excellent for heating. Charcoal is the best fuel for forge use. It contains few impurities and makes a clean fire and is excellent for heating the regular tool steels.

8.—Charcoal is not suitable for heating high speed steels, as it is impossible to get the necessary high temperature with it.

9.—This allows the handle to spring slightly and also prevents stinging the hand.

10.—The top of the vise should be on a level with the smith's elbow.

Some Pointed Comment On Welding Axles and Setting Tires

Richard O'Hearn

I hope that Brothers R. C. Johnson of Kansas and R. C. McGill will take the following remarks in good part, for I wish to say that I do not think their method of welding axles is a good one. The fact that Mr. McGill does not use a welding compound of any kind and that he takes three heats to make a bad job is good enough proof that he works in his own shop, and I trust the following may be of some help to him.

Also Mr. Morris of Alabama gives bad advice to Mr. Frazell of Nebraska, when he says he takes three heats to finish a weld in putting on a point. One heat is sufficient.

Any smith who has worked under a good mechanic who knows his business would never take more than one heat to weld any axle and from 1¼ inch down—one heat to weld and dress it up.

I am with John M'Connell—he knows how to weld axles as well as other things, and in addition has an able way of explaining his methods.

The following is a simple and sure way of welding axles. The ordinary size of buggy axles is $\frac{15}{16}$. To put on a new point, first lay the new point and the old axle side by side and mark the axle where it is to be cut off, allowing ⅝ of an inch for upsetting and waste in welding. Let your scarf be as long as the thickness of your material. Heat to nearly welding point, clean off the scarfs and apply flux to welding or joining surfaces. Now bring to the right heat with the scarfed sides down; bring them out—the helper one and the smith the other—each striking his piece lightly across the anvil, thus knocking off all the dirt and scales from the scarfed sides which still are turned down. The helper now turns his piece over and

places it on the anvil with the scarf up—the clean scarf up. The smith's piece, always scarf side down from the time it is hot enough to hold the flux until it is placed on the piece held by the helper, does not have to be turned over, the under side, (as explained above) being the side prepared for contact with the piece held by the helper, i. e., the short end. (For years the helper has held the "short end", and it is getting shorter every year.)

If you follow these instructions and fail to weld and finish up in one heat I would advise you to go into some other trade.

Mr. J. A. Raper of Illinois asks "Why tires on new wheels are set with the cold tire setter?" Mr. Raper's question would lead us to believe, if we were not better informed, that tires on all new wheels are set cold. Unintentionally, perhaps, Mr. Raper has opened the way for an answer that ought to settle this cold tire setter question. For Mr. Raper's information and for the much needed information of others I wish it known that only the cheaper grades of wheels are tired with the cold tire setter. Every carriage maker in Cincinnati, Ohio, or St. Louis, Missouri, that makes a good grade of buggy always takes the trouble to tell the public that the tires on their wheels are set in the old way—set hot. They tell it to the dealer and the dealer tells it to his customers. Why do they do this?

The manufacturer knows, if anyone does, that the old way of putting on a buggy tire, while more expensive, is so much better than the new that he can well afford the expense for the recommendation, the quality, the privilege of telling the truth about good work. On very cheap buggies the big manufacturer sets his tires cold and says nothing about it.

I know something about this, for I am a dealer in good and cheap buggies, as well as a maker of a really first-class buggy. I make only one grade, and I certainly would not think of putting on any of my make buggy wheels that had been anywhere near a cold tire setter.

Now, if it is a recommendation to a high class job that the wheels are tired in the old way, is it not an admission of inferiority that the tires are put on by the old process? As before stated, this is not my view alone—it is the view of the real big makers of buggies in this country.

I will give five dollars to anyone who can give me the name of any manufacturer of high-class carriages who puts his tires on by the cold process.

A year ago I stood in a large wheel factory where I saw them setting tires by the cold process. Here's how the tire was pulled on cold: The wheel was placed in the machine, hub point down, the power put on and pressure applied. A "dingus" was pushed up against the hub and the dish came in at about a mile a minute. The power was then thrown off, the wheel released and turned half around by the operator. Then the power put on again and the "dingus" again pushed against the hub. The wheel began to crack and crack in the hub. Well, when the wheel had about 2½ inches dish it was removed from the machine and set aside to recover from the abuse it had experienced; which it did in part, that is, in a half hour from the time it came from the machine with 2 or 2½ inches dish, that wheel had 1-inch dish. And from what I know of those wheels I judge that that wheel three or four weeks later had about a ½-inch dish and a loose tire. Let those who want to use cold tire setters do so, and those who do not want them leave them alone, but let no blacksmith, or rather carriage smith, be so foolish as to publicly assert that the cold process of setting tires is better work than the old way of heating the tire for the expansion needed to easily get it on. I do not think any carriage smith would advocate the use of the cold tire setter on good work.

How to know a wheel is on a plumb spoke. Measure from the inside of the spoke just under the hub to outside of spoke on opposite wheel. Then measure from the inside of the rim on the ground to the outside of the rim on the opposite wheel. When these distances are the same, and the distance from A to B and C to D is the same, the spokes are plumb.

Sensible Talk On Side Lines

H. N. Pope

We hear and read a great deal about side lines. I believe every man who runs a shop should conduct it in such a manner that anything outside of the line he is following would be crowded out. If in the carriage and general repairing, with horseshoeing, then stick to it. If trade is a little dull, have some new work to fill in with, a light business wagon or buggy will always sell. Also have made up in stock, neck yokes, double and singletrees. When the public gets to know you have them, they will want to purchase. But it is not a fair deal for a smith to stock up with a line of horse goods when there is a harness dealer in the town. I believe if the time spent talking trade on side lines was taken account of it would come to more than the profit, and one is sure to neglect the main line,

THE SHOP OF MR. W. LAWSON OF NEW ZEALAND IS EQUIPPED WITH POWER MACHINES

for just when he is needed in the shop he will be out in the room where his side line is handled. His customer wants an article he has for sale. He gets the price, spends an hour or two talking and finally leaves, promising to come back in a day or two and purchase. Generally, however, he goes straight to the regular dealer and tells him he can get the same goods up at Mr. Smith's for less. The dealer becomes sore, because he has a rival in trade, marks the goods down to cost price just to keep the other fellow from making a sale. The purchaser has gained his end and purchased the goods for less than the regular price, which was his aim. I would say, however, that unless one has the means to hire his work done, so that he can devote his whole time to the whole business, main and side lines, cut the side line and boost the main line, so that there will be no room for anything else.

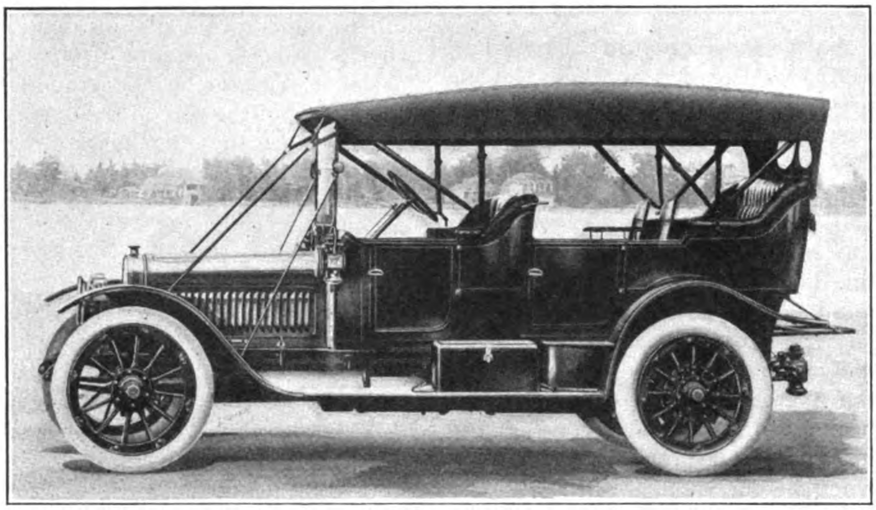
The Lozier Motor Car For 1912

The six-cylinder Lozier is in its fifth season and has gradually supplanted the four in the Lozier line.

The use of ball bearings is one of the marked characteristics of the Lozier six—sixty complete sets of ball bearings. Even in the motor, the crank shaft and cam shafts are mounted on annular ball bearings, four of largest size being mounted on the crank shaft and eleven on the cam shafts.

The Lozier all-steel multiple disc clutch has thirty-one saw-blade steel discs enclosed in the flywheel and run in oil.

Bosch double system is used for ignition, and it is to be noted that this is not the dual system, but two separate and independent ignition outfits are employed, even magneto derangement being insufficient to render the second system inoperative.



THE LOZIER 1912, SEVEN-PASSENGER, SIX-CYLINDER, 50-HORSEPOWER MODEL

Transmission is of the four-speed selective type, direct drive on third with a ratio of three to one. An unusual feature of the transmission case is that it is cast in one piece, doing away with the usual practice of dividing through the center into two halves and thus preventing leakage of oil.

The rear axle system is entirely free from universal joints excepting the main universal at the forward end of the propeller shaft which is carried in a rigid cross member of the frame and is entirely encased and runs in a bath of oil. The rear axle is of the full floating type, the driving axle being entirely relieved from any of the load of the car.

Several interesting points are noted in connection with the frame which is extremely narrow in front, enabling the car to be turned in a remarkably short radius, with the result that the big 131-inch car can be easily handled in dense traffic. These frames instead of being cold pressed or oven treated are made from nickel alloy steel and are tempered in molten lead. All four brakes operate on the rear wheels and are controlled by equalizing bars forty inches in length. Particular attention is called to the hand adjustments on all brakes which are accessibly located so that adjustments can be made in a few moments' time.

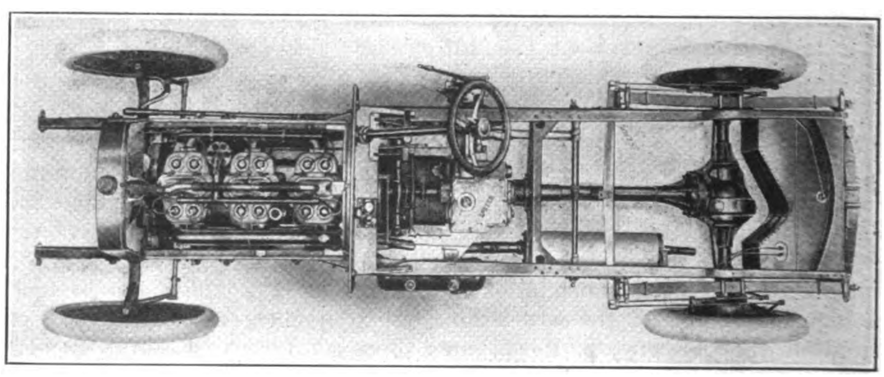
The steering system is fitted with annular ball bearings, even the steering column where it passes through the foot board being mounted on ball bearings. The front axle design is such that the car steers on the castor principle.

Among the small details of refinement noted in the 1912 models is the use of a positive cam-driven pressure pump for supplying air to the gasoline tank. Timing gears are, this season, of the helical type, all steel. The advantage of this type over the rawhide, fiber and other composition gears which have been heretofore used being the fact that it is impossible for the gears to show wear or distortion, insuring silence even after the motor has been in operation for a long time.

Efficiency In the Automobile Engine

J. N. Bagley

When we speak of the efficiency of a gas engine we mean the "ratio of heat turned into work, as compared with the total amount of heat produced by the combustion in the combustion chamber." When we

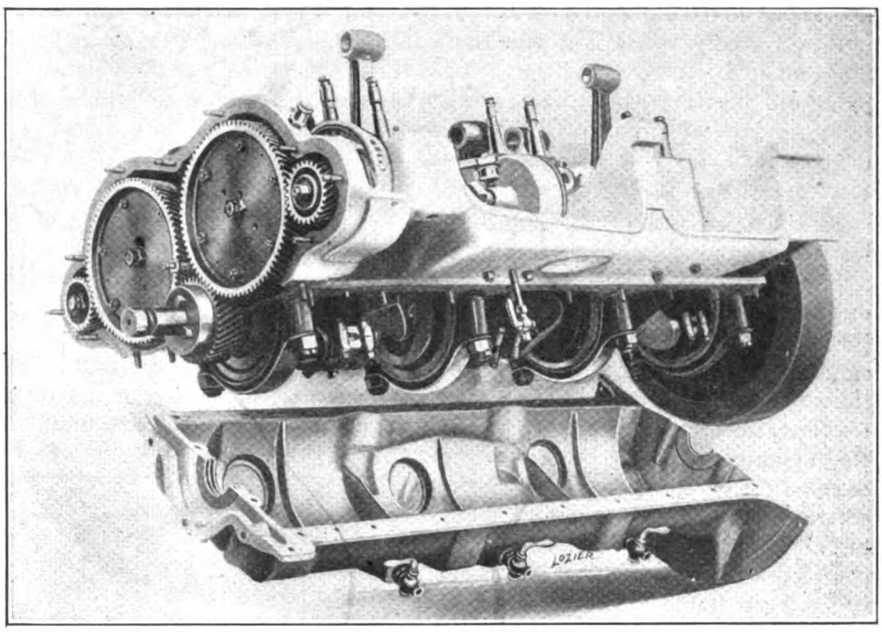


A PLAN VIEW OF THE LOZIER CHASSIS, SHOWING POWER PLANT AND DRIVING MECHANISM

speak of the "British Thermal Unit" we mean a comparison of heat and work based upon the amount, rather than upon the degree as some people suppose. The "British Thermal Unit" might be defined as the amount of heat capable of raising one pound of water through one degree of Fahrenheit. Some have the idea that this is a mere question of temperature, but it is not. However, a small lamp and a stationary boiler furnace might register the same degree on the scale, but we all know the lamp would require a longer time to accomplish the result than would the furnace; therefore, it would take a longer period to generate one thermal unit that we have mentioned.

Many have formed the idea that all the heat generated in the combustion chamber of the motor can be utilized as power. This, however, is a mistaken idea. An engine giving an efficiency of about twenty out of each hundred heat units generated would have an efficiency of 20%. This rule applies to all heat engines used on the automobile. When we speak of mechanical efficiency of a gas engine it differs from heat energy, and must not be confused with it. The mechanical efficiency of a gas engine must, of course, be far below the actual heat generated even with the most perfect machinery that man has been able to produce thus far. From this point of view it seems to be an impossibility to realize theoretical conditions. Therefore, we have learned by experience that there must be some loss or gain of heat as the gas expands. This as we understand modifies the curve of expansion and involves a lower mean pressure than is theoretically demanded to give the required power effect. At the present time there is not a gas engine that will give out or receive the heat perfectly; involving that the mean working pressure is always below that required by theory.

The power of the engine does depend to a great extent on relative proportions among the working parts and depends largely on the following for the best obtainable conditions. First, the use of the very best quality of fuel; second, the best mixture of gas and air that can be obtained by mechanical appliances; third, the rapidity with which the charge is ignited in the combustion chamber; fourth, a means by which the motor may be kept cool. As regards the conditions of fuels we might say that in order to secure the proper degree of power efficiency it is very important that we consider the proportioning fuel mixture, since too much or too little of either air or gas produces the effect of an imperfect explosion in the cylinder; therefore, the engine will not develop the rated power under such fuel conditions. Next in order, we might mention the adequate compression of the charge after it has been drawn to the combustion chamber of the motor. If the compression is not at its best the power of the motor will be affected to a great extent, regardless of a perfect mixture and a good ignition system.

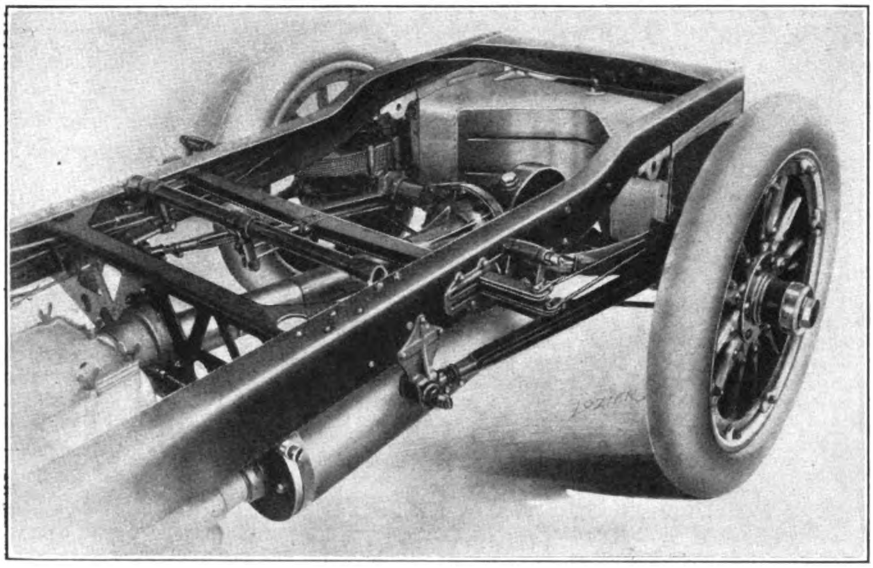


THE LOZIER MOTOR—UNDER SIDE WITH OIL PAN DETACHED

All oils and spirits known to science may be burned if heated to the required temperature which, of course, differs in each case. In the burning of all oils and spirits air must circulate freely where the heating takes place. This air is required, in order to furnish a sufficient quantity of oxygen for the combustion of the gases. Properly speaking this operation consists of nothing but a process of absorbing oyxgen. The temperature at which these spirits or oils give off inflammable vapors is called the flashing point, and the point at which they may be ignited and burned is called the fire point. Now, without a sufficient quantity of air, no liquid, oil or gas will either flash or fire even if confined in a close vessel and heated to a very high temperature. The average quality of kerosene has a flash point of 73 degrees and a fire point of 104, while the high test petroleum has a flash test of 120 and a fire point of about 150 degrees.

The manufacture of a device which will give the correct proportions of air and gas to the cylinder of the motor at all time has attracted the minds of some of our best men, and while the problem is not perfect by any means it has been well handled considering the time the gasoline motor has been in practical use. In an engine cylinder, closed from the outer air, it is necessary to know how much air is taken to the cylinder with the gas. The most efficient proportions of air and gas mixed to give a perfect combustion in a closed cylinder, of course will be considered a matter relative to the kind of gas employed—some gases require more, while some require considerably less.

As before stated, a correct degree of compression is essential to perfect efficiency in the engine, from the fact that a more complete mingling of fuel ingredients is thus secured. If the amount of gas taken to the engine cylinder is excessive as compared to the amount of air, the gas will be slow to ignite and the engine will seem to be sluggish while it will give off a black dense smoke from the exhaust having a very disagreeable odor. While, on the other hand, if the gas is of a small amount and too much air the engine will fail to have the rated power, and miss



DETAIL OF REAR END OF LOZIER CHASSIS, SHOWING TANK, ETC.

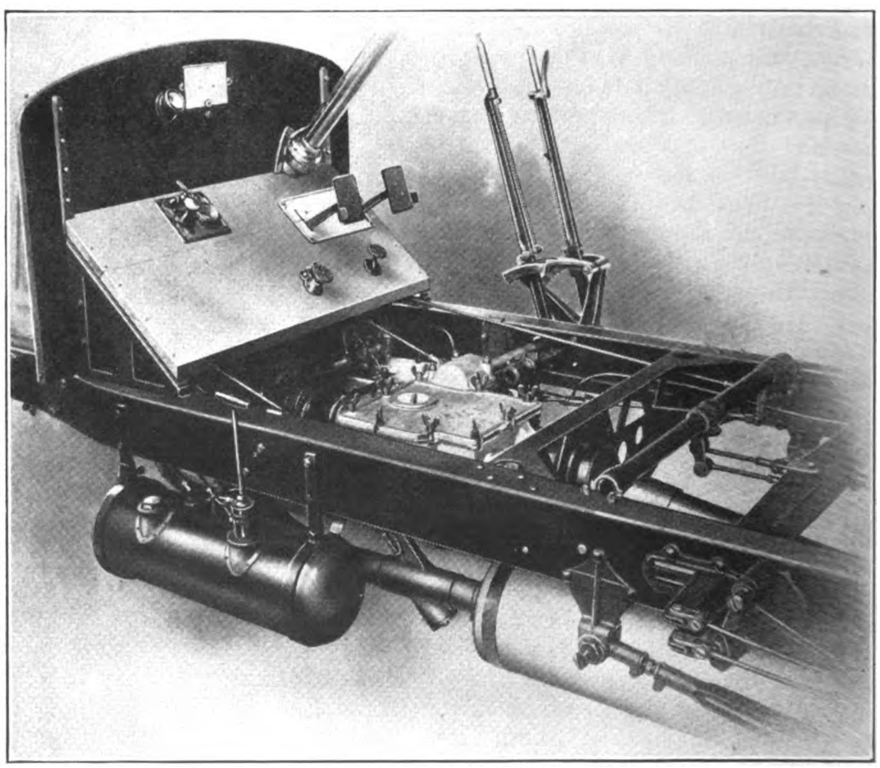
explosions and skip and pop in the muffler. Many times if a very low grade of fuel is used it will have the habit of missing, as with a weak mixture, but will give off the black, dense smoke as with the over-rich mixture.

In the operation of the engine it has been universally agreed that a large amount of heat and power units are lost in the exhaust. One of the principal reasons why this loss cannot be avoided is that the gas, after the explosion, may not be expanded to the atmospheric pressure within the cylinder. At the time of the completion of the power stroke the expansion line stands generally about or above the figure indicated for compression pressure. For this reason it has been found necessary to open the exhaust before the completion of the power stroke or at about 7/8 of the power stroke. Were the engine timed otherwise, and the piston allowed to receive the pressure of the expanding gas through its full stroke, the gas would not exhaust fast enough to avoid buffing the piston on its return stroke, since through an appreciable distance the continued expansion would balance the rate of escape through the exhaust passage. In case of a defect of this kind the power of the engine would be affected until it would scarcely run, to say nothing of hauling a load.

The expansion of these gases following the explosion is not instantaneous, as supposed, but continues throughout the entire stroke; therefore, the temperature is constantly kept up, which would otherwise fall to the maximum temperature of the atmosphere. The expansion line on the indicator card will not meet the line on the compression line at the end of the stroke, as should be the case under theoretically perfect condition; therefore, the exhaust valve must be opened about 7/8 of the working stroke, as already explained.

The exhaust from the cylinder being commonly expelled at a pressure between two and three times an atmospheric would naturally make considerable noise were it not for the device which we call the muffler or silencer. The object of this muffler is to break up the exhaust gases by causing it to pass through a number of fine holes in the exhaust tube, and by the time it reaches the open it is very near the atmospheric pressure, consequently very little noise is heard at the opening of the muffler. There are today several efficient types of mufflers on the market, and they all have the same object in view. The holes in these mufflers being very small, many times become stopped up and fail to let the exhausted gases pass through them free. In this case the power of the engine is affected to a great extent. The muffler should be examined from time to time and the holes kept open. All mufflers to a certain extent cause a certain amount of back pressure, which cannot be avoided. Many manufacturers equip their cars with the ordinary muffler and place a muffler cutout in the exhaust pipe between the exhaust valve and the muffler. This valve may be opened at the will of the operator, and the exhaust, instead of passing through the muffler, is exhausted into the open through the cutout valve. Good authorities claim that on a 40-horsepower car at least 6 horsepower can be saved by using the cutout.

Aside from the above mentioned,



DASH BOARD, OIL RESERVOIR, MUFFLER CUT-OUT AND OTHER PARTS BELOW THE FOOT BOARD

pertaining to the power of the gas engine, we may add the cooling system. By far the greater proportion of gas engines—those employed alike for power purposes in general and in propelling the motor-driven vehicles—have water-cooled engines. In this case the cylinders are cast with a jacket around the cylinder proper and the water circulated between the space and the feed tank or the radiator, whichever being employed.

There are two systems of circulating this water through the space in water jacket: by gravity and by forced or pump circulation; in accordance with the laws of liquids, which cause the layers of heat to rise from the bottom to the top of the tank or radiator and the cooler layers to fall correspondingly. When we speak of pump or forced circulation we mean the forcing of the cooling liquid through the water jacket under impulse from a rotary or centrifugal pump. This pump keeps the cooling liquid in a continual motion and has advantages over the gravity or thermal syphon system—as it is sometimes called.

In the past few years air cooling for the automobile engine cylinders has been successfully achieved in a variety of ways, but the most common seems to be by the means of fins or gills cast to the outer surface of the cylinder. The air radiates the heat from these fins and keeps the engine reasonably cool. By combining large radiating surfaces with low speeds in multiple-cylinder engines it is possible to keep the engine cool, to a reasonable extent. The most successful air-cooled engine seems to be the one that has the auxiliary exhaust combined with the surface radiation. The air-cooled engine has a fan attached for the purpose of increasing the radiation with the currents of air when the engine runs at a high speed. These fans are generally driven with a belt from the pulley on the crank shaft.

The principal reason for cooling the cylinder of the engine is that the temperature of the cylinder is normally maintained below the point at which the lubricating oil will burn or carbonize. Furthermore, the cylinder walls would become heated to such an extent that the charge would be fired before the piston head had reached the correct position. The cooling system above stated is a positive necessity over the combustion space of the cylinder, for the reasons already mentioned it forms a serious consideration in estimates of efficiency by absorbing a large proportion of the heat units generated by the ignition of the gas in the combustion space of the motor. The nearer the temperature of a cylinder can be kept uniform, the better power it will be capable of developing. A cylinder that is cold causes a loss of power because the gas does not readily vaporize and is slow to ignite. A cylinder that is too hot will not give the required power, because of the extreme heat affecting the lubrication to such an extent that it will turn to carbon, and this carbon deposit will take fire and ignite the charge before the piston has reached the proper position in the cylinder, consequently the engine will either be stopped or will have very little power. Pre-ignition should not be allowed, as it causes an unnecessary amount of strain on the working parts of the motor. A poor grade of lubricating oil will many times cause a deposit of carbon to form in the combustion space when the temperature of the cylinder is not far from correct.

In case the motor overheats, the cooling system should be looked to, for it will many times become stopped by some foreign substance, or the pump may have become broken.

There are, of course, other reasons for the engine overheating but the most likely causes are: choked radiator or other part of cooling system, and broken pump or failure of the pump to rotate. Loss of water in the cooling system will also cause overheating, while an inefficient exhaust valve may also cause the same trouble.

THE WELL-BUILT SHOP OF MR. W. B. BRIANT, OF NEW JERSEY

The Construction of Leases and Some Suggestions for Protecting One's Self

ELTON J. BUCKLEY

Any lawyer whose practice is among business men to any substantial extent will doubtless agree with me that probably 60 per cent of all the problems that his clients bring him to solve are landlord and tenant controversies. And this I find to be so whether the client happens to be the landlord or the tenant. The interpretation of leases is a constant source of discussion between the parties, and very often this discussion ends in the courts.

In my judgment nine tenths of these controversies are due to the fact that the tenant does not carefully read and thoroughly understand the lease before signing it. A lease is usually a long, involved and altogether formidable document. Many parts are unintelligible to the average layman, who seems to prefer consulting counsel about it after the trouble has arisen rather than before, as a means of preventing trouble.

Some special instances of the danger of signing a lease without reading it have recently arisen in my own practice, as follows:—

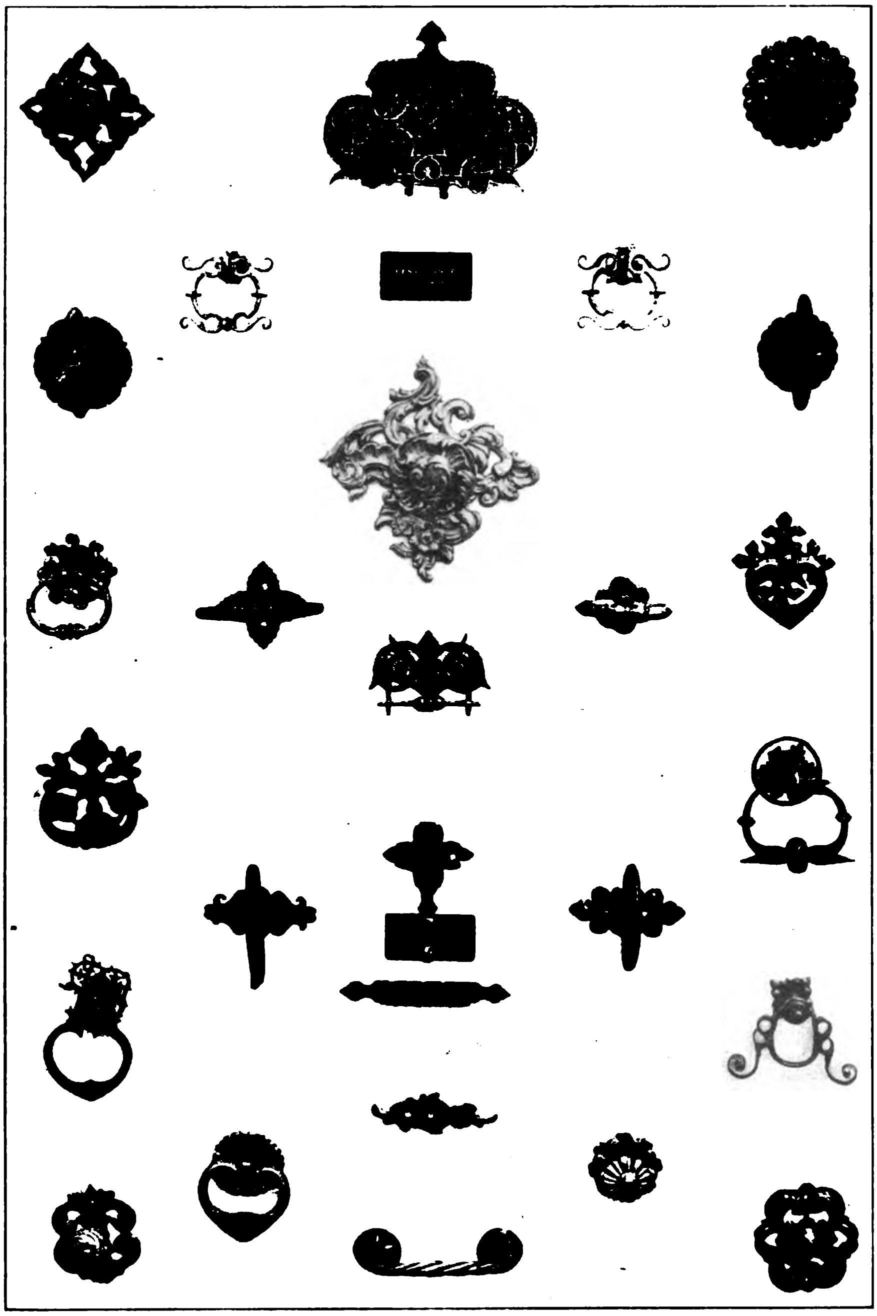
A client rented a large and expensive property without either reading the lease carefully or consulting counsel about it. He found when it was too late to help himself that the lease bound him, in addition to

paying the stipulated rental, to pay also the taxes and water rents. In effect, he had bound himself to pay about 18 per cent more rent than he would have dreamed of doing had he known.

Another in the same position found that he had bound himself to keep the property insured for the benefit of the owner.

Still another, who really was the most unfortunate of all, made a number of costly improvements under the impression that they would be his property and could be removed at the end of the term. When the landlord denied this right, and the tenant finally consulted counsel, it was found that he had signed a lease which provided as plainly as language could do it that all improvements made by the tenant should be the landlord's property.

In every one of these cases, and in legions of others, the tenant could have protected himself had he known the meaning of his contract before he signed it.



SOME HINGES AND DOORKNOBS OF THE SIXTEENTH CENTURY

There are in general use throughout the greater part of the United States printed leases which substantially follow the same form. Some States with special landlord-and-tenant laws use forms which differ slightly, and some landlords, usually of large buildings or apartments, etc., use forms which they have devised to fit their own needs. The lease in average use throughout the country, however, differs but slightly in substance and provision, though it may in wording.

The provisions which give rise to the most controversies on the subject are three: 1, the question of repairs; 2, the question of improvements, and 3, the question of the termination, notice to vacate, etc.

Some leases are silent as to whether the landlord or tenant shall make the repairs. Under such a lease the tenant is invariably held liable for the repairs, as the rule is universal that a landlord is liable for repairs only when the lease specifically says so.

Other leases go further and distinctly put the repairs upon the tenant. From such a lease, which is a general form in common use, I take the following:—

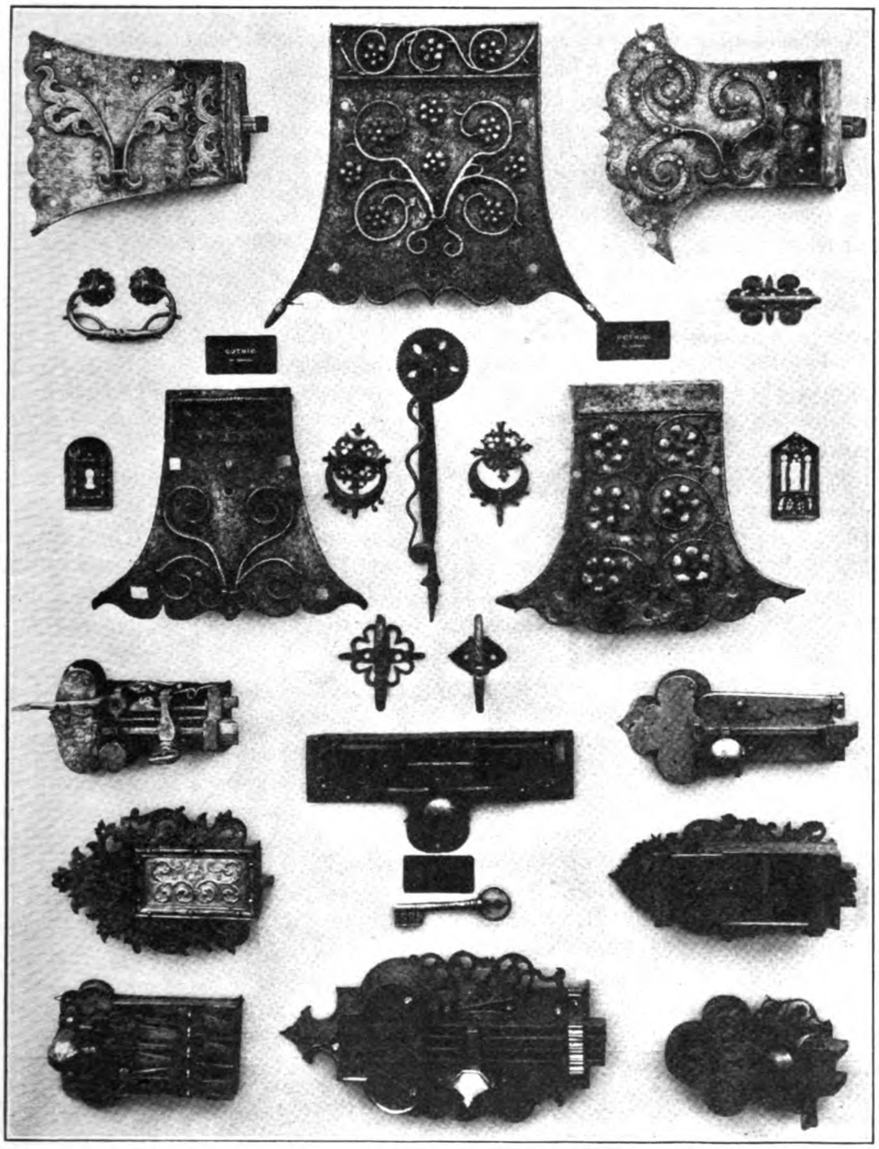
The lessee (tenant) shall and will permit the lessor (landlord) and the lessor's duly authorized agents or workmen to enter the premises at all times and have full ingress, egress and regress into, out of and from the premises for inspection as well as for making repairs, alterations or additions to the property which the lessor may deem necessary; but nothing herein contained shall be so construed as to impose any obligation upon the said lessor to make any repairs. It is agreed that the said lessee shall and will during said term, at the lessee's own proper cost and expense keep every part and portion of the devised premises in good order and repair.

Under this provision the lessee binds himself absolutely to pay for the repairs, though he would be liable anyway, even without this provision, by reason of the rule above quoted that the lessor is never liable for repairs unless he definitely binds himself to be.

Other leases—and this is the usual rule—take care of the matter of repairs by providing that the tenant shall redeliver the property to the landlord at the end of the term "in as good condition, order and repair as the same now are, reasonable wear and tear (and sometimes accidental fire—E. J. B.) excepted." This also binds the tenant to make the repairs.

I say again, and I am repeating it because it is highly important and not at all understood, that the tenant who expects his landlord will make the repairs to his property will be disappointed unless he insists upon a specific provision to that effect being added to the lease. It makes no difference whether a landlord has been accustomed to make the repairs or not—without a clause in the lease he can stop any time he chooses and compel the tenant to do it

This rule placing the burden of repairs upon the tenant was under the common law carried to outrageous lengths. Under the common law a tenant who signed a lease which expressly or impliedly bound him to make repairs was compelled to rebuild at his own expense if the property burned. And this even if the burning was wholly accidental. This rule, however, has been relaxed in practically all the States: in fact most forms of lease now cover it themselves by providing, as I have indicated in the parentheses a few lines back, that a tenant shall return the property in good condition, "reasonable wear and tear *and accidental fire* excepted."



HAND WROUGHT LOCKS AND HANDLES OF THE FIFTEENTH AND EARLY SIXTEENTH CENTURIES

The rule is settled that the tenant who makes improvements to the premises without a provision in the lease or a contract with his landlord must leave them behind at the end of the term and cannot recover their cost from the landlord. The operation of this rule is not altered even if the landlord specifically consents to the making of the improvements; he still may claim them. What is needed here to save improvements to the tenant is a clause in the lease or an agreement—in writing—with the landlord.

Upon the question of termination, notice to vacate, etc., the most that I can say, since every lease contains its own provisions as to notice, and so on, is that the landlord or tenant who contemplates terminating the lease should be extremely careful to see what the lease says about notice, and to follow it, otherwise one or the other may be tied up for another year; in one case I know of a landlord was tied up for five years.

A few other points which should be watched come into my mind:—

The owner of a property who rents it to another does not warrant it to be even habitable or fit for the purpose for which he knows it is to be used. The law casts upon the tenant the burden of finding this out for himself.

The tenant who signs the ordinary form of lease will practically always find himself bound to use the property for one specific purpose only. If he uses it for any other without the landlord's consent the lease is broken and he may be ousted.

By the terms of the ordinary lease a tenant may not assign it to another without the landlord's consent, and if he attempts to he can still be held liable for the rent.

When a rented property is sold the lease is not disturbed; the tenant simply has a new landlord and holds for precisely the same term. Otherwise in that case of a sale on foreclosed mortgage, etc., however, where the lease was made after the mortgage. In that case the buyer has the option of terminating the lease at once.

The lease of a tenant who goes into bankruptcy is usually terminated by that act, no matter how long it would ordinarily have had to run.

Look Out For These Chaps

A. P. Harmon

Look out for agents pretending to take orders for sickle and tool grinders. One came through here this fall taking orders and appointing blacksmith agents, collecting half the wholesale price, balance to be paid when sample was sold. Several

of us got "stung". He claimed to be representing Mitts & Harper, Wichita, Kansas, but as yet the firm has not been found. If any of the craft know of any of his recent operations please communicate with me at Grandby, Missouri, or, better yet, with the Carborundum Company, Niagara Falls, N. Y.

Locomotive Frame Repairing

J. A. Jordan

There are a great many ways of repairing frames, so I will explain how we repair them at our shop at Houston. On the engine we have repaired them with oil at one time and made a fair job. Of course, welding the frame on the engine is a makeshift job and always will be. You can never make a first-class job on the engine, as you cannot get stock enough on each end of your weld. The frame will waste away in making your heat, no matter what you heat with,—gas, oil or Thermit. But we have to weld them in the round house to keep the engines in service. At present we are welding them with Thermit. I think it is the best temporary job you can make on the engine and the cost of welding is very small. A moulder is taught how to do this class of work, as he can make his own mold and can do all his own work, and only when taking off the heat he has a helper. He has been welding all the frames that can be welded under the engine this last four or five years, and very seldom is he out in the length more than $\frac{1}{16}$ of an inch, which can be made up in the shoes and wedges. An ordinary weld does not exceed more than twelve or fifteen dollars. Of course, there are cases when the frames cannot be welded in the round house. They have to come to the blacksmith shop and be welded on the anvil when they break under or near the fire box or under the cylinder. When the main frame has to come down and be brought to the shop, that generally costs over one hundred dollars for labor and material before the engine can be put back into service and will take about a week's time. We have frames on our E. D. and C. W. engines that have been welded with Thermit five or six times and they have knots all over them. They look about as neat as a knarled root. We generally cut out all these welds when the frame comes in the blacksmith shop and make a first-class job of the frame, and also make it to the proper length.

In my opinion, and I think I am not far out of the way when I make this statement that the frames constructed by the different locomotive works in olden times, say twelve or fifteen years ago, were never made heavy enough to stand the strain that the frames have to stand. If the frames had been made about one half as strong again you would have but a very few broken frames. It is useless for me to talk about the strain put in a frame when you weld it. In the first place you don't know if there is a strain put in it, and in the second place you don't know where the strain is. The only time you know is when the frame breaks again in another place. Then you say that is where the strain was. Now in our Common Standard Consolidated 800-Class engines. We have fifty of them on this division and have had them about ten years and they are constantly in use. We have had three broken frames on them and they were all broken in the bottom rail. Of course, those frames are all steel and made very heavy.

With our 700-Class C. S. ten-wheeled passenger engines we have no trouble with the frames breaking, neither have we any trouble with our Mallet-Mogul Compounds, 900-Class. Of course, the last two named are only two or three years old, but this simply shows that the locomotive works are making great improvements in frame constructions of late years.

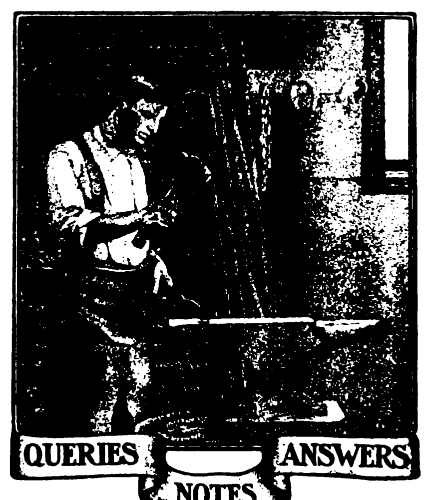
Frames break in every conceivable manner and different places, and the man who does this class of work has to study on every frame he has to repair, how to make the weld and the quickest, best and easiest way to get the job out.

The Gasoline Engine

(*Continued from page 109*)

Suppose now that the explosion has just taken place, driving the piston down through the cylinder. As it reaches the bottom it uncovers the exhaust port E, and as the gases produced by the exposition are under high pressure they instantly rush out or exhaust themselves through that opening. At nearly the same time the inlet opening F is uncovered and the gasoline mixture in the crank case which is under pressure when the piston is down rushes through the passage M (called the by-pass, which connects the crank case with the inlet opening), and fills the cylinder in place of the burned gases which have just rushed out through the exhaust port. The incoming gas is kept from mixing with any of the old gas that may not have entirely left the cylinder by the baffle plate N which is on the top of the piston and a part of it.

This has all taken place quickly, and as the piston starts to go up both openings are closed by it, the cylinder being now full of the gasoline mixture. The piston is carried upward by the momentum of the flywheels and compresses the mixture in the top of the cylinder; the electrical connection is made and the spark jumps, exploding the mixture, and then it is all done over again. The upward motion of the piston also sucks more gasoline and air into the crank case, ready for another charge.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

How Many Kinds of Steel.—Kindly tell me how many kinds and the names of the different steels that smiths come in contact with, such as silver steel, etc.

B. W. S., South Dakota.

Questions On Machine Work.—I would like to see some good articles on lathe work, rules for measuring, taper boring, and measuring instruments.

J. D. Hatcher, Texas.

Shoeing Questions.—I wish some good brother would tell me how to shoe a horse to keep him from falling down. I have a horse that was a bad one to crossfire, but have handled that all right, but, since he has stopped crossfiring he stumbles on smooth roads and falls down.

W. L. Haines, Pennsylvania.

Wants To Temper Springs.—I would like to know how to temper small springs, such as springs in general for revolvers and guns. Also, kindly advise if buggy spring steel is a good steel to use for the purpose.

W. R. K., Washington.

Screens On the Shop.—I put screens on my shoeing shop last summer, and you can tell the craft it is a good investment, for it makes the work easier.

I am going to build two forges in the spring and would like to see a good plan or two. L. O. LEWIS, Illinois.

Favors Cold Setting.—Am especially interested in the discussion about hot and cold tire setting. Brother Oscar Carlson, of Nebraska, expresses my opinion on setting tire to a nicety. Up to about eighteen months ago I was of the opinion of Brother W. K. Huff, but have changed since I have a Mayer's cold setter with power attachment, and I can do satisfactory work today. I have my customers' judgment for same. I have set about 320 tires this season, which have paid for the setter.

L. J. PISHNY, Kansas.

Wants a Lawn Mower Grinder.—We have a fairly well equipped shop, but are short a lawn mower grinder. There are a number of machines to do each season, and the old way of grinding the blades against the face plate is tedious and unsatisfactory. Could any of the readers of THE AMERICAN BLACKSMITH give the details of a simple home-made grinder for this purpose? Something suitable for application to an ordinary lathe and which would utilize the wheels which have become too small for the ordinary emery grinder.

JOHN OSWALD, Scotland.

A Question On Forge Work.—I wish some brother smith would give me some information as to how to do the following job: I have several hundred links or buckles to make, about 3¼ inches square inside, to be made out of ¾-inch round iron and welded at one corner. The other three corners want bending at one heat, if possible, to be fairly sharp at the bends, but not reduced in area. I have another lot of ⅞ inch round, 4¼ by 3¼ inches inside. I think, myself, that these corners will be best worked separately, but any information on the subject will be appreciated.

R. HOLLINGSWORTH, England.

On Cold and Hot Setting.—I have been reading a great many different articles on cold tire setting. I endorse Brother Jay Jacobs, of Iowa. I have a cold tire setter in my shop, and it takes from fifteen to twenty minutes to set each tire, and do as good a job as can be done. They are the finest thing I have ever seen for the traveling public, and the custom that wants you to follow them and do their work as they go home and don't care to pay for it. It will not, however, do for the good customers; I like the old way best. I have been running a shop thirty years, and I can beat any smith setting tires who will use a cold setter. I think cold setting is nothing but guess work, for you don't know how much you need to saw out and how much to shrink. G. F. GOBEN, Texas.

When the Tire's Smaller.—With reference to tire setting, I have noted the various discussions and will say that it is impossible for any smith to make the tire ¼ of an inch smaller than the wheel. If he does make his tire ¼ of an inch smaller, one of two things will happen—either the tire must stretch, or the wheel must contract, for it is impossible for a circle, measuring 3 feet plus ¼ of an inch, to be placed inside of a circle which is only 3 feet. As to the cold tire setter being a success, I have this to say: They are not made for wedging spokes, but just to set tires. I use a Scientific and don't want any other.

B. E. BLOUNT, Texas.

How To Do Babbitting.—Replying to W. B., Missouri, in the November issue, wish to say how boxes are usually babbitted in a machine shop. The box and shaft together are heated until one could not handle with bare hands. The shaft is then painted with a heavy coat of white lead, sometimes graphite being added to the application of white lead, which is better. The shaft is then placed in position, the ends of the box are closed up with clay, provision being made for the escape of the air. The shaft is provided with means to turn the same quickly. The babbitt is now heated and, when melted, a pine stick is thrust in the melted metal to ascertain the temperature. When the metal blazes the stick, it is in proper condition to pour. The metal is now poured in the box; when the metal begins to set, the shaft is turned, which allows its removal with ease. Do not wait until cool, but turn at once, or as soon as the metal begins to set.

J. C. LAMON, Tennessee.

Shoeing For Forging.—Mr. Samson, in the November issue, requests fellow smiths who have tried his plan of shoeing for forging to give their results through "Our Journal." I have been shoeing for many years and have used shoes of this design with perfect success until the last twelve months. I now have a case that puzzles me. The animal is low at the withers, high in hips and short in back, and forges so badly that he wears the hoof through in front above the shoe. I have to put a plate in front of the hind hoof for protection.

Regarding tire setting, the cold way may do for some wheels and in some climates, but the good old way is the best all around. Mr. Davis could not make a tire stay right for twelve months out here in the Sacramento Valley of California, where the climate is hot and dry.

In figuring over carefully the time it takes for carefully shoeing a horse, I want to say that the job could not be done in the time mentioned by the fast shoers.

C. E. BECK, California.

Welding Axles In One Heat.—If Brother McGill lived in this locality he would have to weld his axles in one heat; of course, barring accidents. Now, we are told, "it is not good for man to be alone," and I think this applies to Brother McGill's case. We take many welds here, from the lightest to two-inch welds, and we are not good natured if the jobs are not done in one heat. If a compound will help, no one is ashamed to use it. There are many of these on sale, but I think the Climax fills the bill. I, myself, prefer to take borax and melt it down to get the water out of it then to mix it with clean iron chips and pulverize. This will weld anything that will weld. For a weld in cast steel that does not want to show, borax alone is the only thing to use, as the iron will leave a light streak across the steel where it was lapped. Now, I would say to Brother McGill, cut out your three greasy heats, take one good welding heat and don't be afraid to use any of the compounds on the market, as they are all good, and it is only necessary to get used to them. H. N. POPE, Connecticut.

Some Cold Setter Talk.—Replying to Brother D. F. Castles as to cold tire setting we agree with him as regards hurrying, but not as to nuisance. He says they don't give satisfaction and that he never knew of a cold tire setter which paid for itself. We have a Mayer's cold setter that we bought by making a small payment, the balance to be paid by fifty per cent of the proceeds from the setter until paid. We paid for the machine the first year. We live in a small town of four hundred population, with two blacksmith shops. We set ninety per cent of all the tires and give the best of satisfaction. Farmers come from adjoining towns to get tires set, and we also set all of the tires for a livery stable in an adjoining town. If a cold tire setter is handled right it is far superior to the old method. Having used several different makes of cold setters I have found some of them good and others which are not.

C. W. GARLAND, Missouri.

Prefers the Old Method.—Referring to the talks on cold tire setting I can, like Brother W. K. Huff, secure a better job setting a tire the old way which will not crush the wheel, as I have seen the cold tire setter do. Nor will the tire kink, causing it to break later on. I have set dozens of tires cold and have seen others set them cold and with all carefulness, but that kink will come seventy-five times out of a hundred. Now, I do not object to anyone using a cold setter, but my customers are very much dissatisfied with it and prefer the old method of setting the tires hot. I have seen the tires so loose as to fall off the wheel in three weeks after cold setting—good, solid wheels, too. I have seen kinks in tires you could put a lead pencil between the tire and the rim of the wheel; the kink flattens down and the tire is loose again.

RICHARD LOADER, Kansas.

To Gum a Circular Saw.—A brother from Montana wants to know about gumming a circular saw. Any ordinary emery stand is good, if it has the power and speed. I use a ¾-inch, round-edge, wire-web stone, 12 inches in diameter, on a Juanita stand, running at about 2,500 revolutions per minute. Now set the rest ¼ inch from the edge of the wheel and just level with the center of the shaft. Get a piece of ½-inch hemp rope and tie one end to a joist overhead and a piece of stout wood to the bottom end just exactly level with the shaft of the stand. Put this through the eye of the saw and adjust it so it will just clear the edge of the wheel. The rope will hold the weight of the saw and at the same time you can control it easily. This is for about a forty to sixty saw, but it will do for any size. All you have to do is change the wheel to suit the teeth of the saw.

H. T. F., Arkansas.

Raising Prices in England.—After ten years of persistence and hard work I own my present shop, but, feeling that the prices received for work were too low, I raised them on all work on January 1st, and give a few of them below:

Farm horses, shoeing all size	3s	($ .73)	per set
Clee Hill Ponies, up to 14 hands	2s 8d	($ .65)	" "
Clee Hill ponies, over 14 hands	3s	($ .73)	" "
Draught horse, up to 16 hands	3s 6d	($ .85)	" "
Draught horse, over 16 hands	4s	($ .97)	" "
Special beveled shoes for show or sale purposes	5s	($1.22)	" "
Shoes punched for frost studs, extra	1s	($ .24)	" "
Removes, half-price, minimum	1s 6d	($ .36)	" "
Frost studs, ¼ to ⅜	9d	($ .18)	" doz.
Frost studs, ⅜ to ½	1s	($ .24)	" "

I do not know whether I will be successful in securing the above prices, for the farmers don't seem to understand or appreciate a good job from a cheap one, but patronize the man who does the work at the lowest price. I employ one man, and we work from six to six, except Saturdays,

when we stop work at two o'clock. Ordinary bar iron costs us 8£ ($38.93) per ton, and coal about 21s. ($5.00) per ton. Most of the blacksmiths in this district make their own shoes. T. NORTHWOOD, England.

Fast Shoeing, Axle Welding and Competition.—I am glad that we have such wonderful men in our craft as the brothers that do such fast shoeing. Wonderful! Also, the man that has a son for a "cub" that has such a temper—I mean that can do such wonderful tempering that he can take a small chisel, temper it and drive it through a thick piece of steel.

I want to say a few words to the brother that had trouble welding on axle stubs. You want a good, clean fire. Cut your axle the proper length and scarf axle and stub. Leaving the scarf a little rough, put in fire, scarf up, then, when red, put on some compound on the scarf, heat a little more, turn the axles over in the fire and put on a little borax. When it comes to a welding heat, take it out and jar it on the anvil to knock off the coals, etc. Then weld as you would any other similar piece. I read of one smith that does not use borax or compound to weld axles. Well, they can be welded without the use of them, but can be welded better and easier with them, and that is what compound and borax are for, so why not use them?

I would like to know a simple process of tempering automobile and buggy springs. Someone that has had actual successful experience, please let me know.

I believe in good prices. I believe in competition, but let the competition be in mechanism, not in dollars and cents. I plead for a uniform price list in each locality. I believe in being on friendly and neighborly terms with my brother smith. If you have a competitor who is not on friendly terms with you and who seems to be underhanded in his dealings, go visit him, say every ten days. Do not tell him that you know it all. Allow him to know most everything, if necessary. Make yourself very friendly; there is no use in bad feelings just because you are in the same business. Treat him as you would have him treat you. U. S. HARDTEN, Kansas.

A Letter From An Australian Veteran.—In the first place I never use any sand for welding. In place of it I take a nice burnt brick, not too hard, and pound it up. Years ago I worked in a locality where sand could not be obtained, and we used brick pounded up in this way and have always had success with this method. I have welded axles up to 3½ in the first heat, also springs. If you should have trouble in welding a job of this kind mix a little coarse salt with the brick and you will get the best of results.

I have two pairs of bellows, one 3 feet 6 and the other 40 inches, with which I make good welds, making the fire according to the nature of the job. Some few years ago, when the "Yankee Blower" was placed on the market, I bought two of them at 5£ each. Neither of them gave satisfaction, so that I returned to the use of my bellows. I do all kinds of work, wagon and buggy building, wool press making and plow work.

I noticed some time ago a brother smith wanted to know about tempering mill picks. Draw them well to a blood-red heat, both ends, and then heat one end to a blood-red and put carefully into a tub of fresh water. You will find that they stand up all right.

I have done a lot of spring making. I never use any oil for letting down the temper. According to the quality of steel, in bending I run the spring through the fire back and forward and fit the spring with a few taps of the end of the hammer. Let it then cool off.

I am seventy-four years old and still carrying on business with three assistants. We shoe on an average forty horses a week. D. HARDY, Australia.

A Letter From Shetland.—THE AMERICAN BLACKSMITH is an interesting paper to me, although the branches treated are not exactly in my line, yet, notwithstanding, there are many valuable gleanings in it for me.

Some time ago I requested some one of my skilled brother craftsmen to give me information on tuyere irons, but have not yet had an answer. Comparatively few smiths can answer this question correctly. Very often bad coal receives the blame, when it is the misplacement of the tuyere iron that gives the dirty heat, the length in getting it and other evils which follow. These discussions are a help to all the trade and I want to help others as well as myself, but in order to do this we must stand shoulder to shoulder and help each other along. All buy THE AMERICAN BLACKSMITH to help them, and while some information helps one and not another, still when all is added together and balanced up all are benefited. The country smith receives the greater benefit, for he is not so closely connected with the newly invented machines, etc.

I think those of us who find other smiths doing a piece of work in any but the best way we should be more diplomatic in referring to it, so as not to discourage the smith who has a much better way of doing a job to write explaining it. Twenty years ago I would not have laid down my hammer to another thinking that he could weld and forge better than I, but I am still learning how to do it easier and better. When a smith can stump on five pieces of iron 2½ x 2½ x 1 inch on a bar 2½ x ⅝ x 15, turn it around, welding it in a ring with all the pieces outside and punching a one inch round hole in each piece, rounding each on the anvil for hooks to go in and when finished to be solid without a flaw I say that man is hard to beat. This ring is used for vessels' topmast fore and double backstays. P. PETERSON, Scotland.

PLOWING UP A SUGAR CANE FIELD, IN COLUMBIA, SOUTH AMERICA

Welding, Shoeing, Circular Saws.—I have seen in the last few numbers of THE AMERICAN BLACKSMITH that some brother smiths take exception to my method of axle welding and compound using. I will admit that I don't know how to use the welding compound. My good brothers have not, however, told me how to use it. I noticed in several recent numbers several welding compounds—the E. Z., the Crescent, the Anti-Borax and the Delmas welding plates, but they don't advise how to use it. Do you put it on your weld after you get your heat and lay the iron on the anvil, or do you rivet your pieces together with the welding plate between them? I think that when anything is advertised to be used or to work with, the way ought to be explained.

These welding compounds are all right for a man that has a helper to stand at the anvil with a stub broom to brush off the weld. I take good coal, clean out my firebed well and then take about a nail keg full of good coal and char it well before I start to work. I use only sand, unless I get some iron or steel that is hard to weld. Then I take a piece of thin flat iron and heat it with the other and, after getting the other to a good welding heat and the flat iron to a melting heat, I have my helper to bring one piece out of the fire, and I bring the other two pieces and put the melted iron between the other two pieces, and it makes a good job.

I notice where one of my good brothers can shoe a horse in four minutes, which averages only one minute to a foot, so that, if he can get all the shoeing he can do for twelve months and get cash for all of it he can surely retire from business. It takes me four minutes to clean out the feet before paring them, and it takes me from forty to sixty minutes to shape the front shoes and pare the feet and shoe a horse all around.

The best way to gum circular saws by hand is as follows: I have worked in small mills and have filed and ground saws, and this is the way I fixed to hold my saws. I made a frame of three posts and put a bedstead caster on top of each post, having it high enough so that when I laid my saw on the table it would touch the center of the emery wheel. These rollers work perfectly. The saw can be turned any way, and it seems as if the rollers pull or push the saw. It works all O. K., and as for laying off the saw I take a straight edge and lay it across the saw and divide the saw in four parts and mark the teeth with a piece of chalk. R. A. MCGILL, Alabama.

TIMELY TALKS WITH OUR SUBSCRIBERS

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American Blacksmith Subscriptions

like other blacksmith shop necessities are now sold through jobbers. Ask your jobber or his salesman about the ease and convenience of subscribing through him.

The following jobbers are now selling AMERICAN BLACKSMITH Subscription Coupons (other jobbers will be named as soon as arrangements can be completed):

Shattuck-George Iron Co., Wichita, Kan.

St. Louis Iron Store Co., St. Louis, Kan.

Barlow Hardware Co., Corry, Pa.

Fort Worth Heavy Hardware Co., Ft. Worth, Tex.

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The R. E. Bell Hardware Co., Weatherford, Texas.

ASSOCIATION SECRETARIES

Arrangements will also be made with the secretaries of the larger associations to handle AMERICAN BLACKSMITH Subscription Coupons. Additional names of secretaries will be announced as these arrangements are completed.

Austin English, Secretary-Treasurer, Kansas State Association, Hutchinson, Kan.

A Fountain Pen, Free

Do you want a good fountain pen, free? Not a cheap affair that looks like a good pen, but one that is good. This is a full-sized pen made by a prominent manufacturer. The barrel and cap are of rubber, highly polished. The gold pen point is 14-K. and is perfectly made and hand tempered. The pen tip is of genuine hard iridium and will wear almost indefinitely. With the pen comes a filler and a guarantee certificate signed by the manufacturers. Full directions for filling, cleaning and using accompany each pen. This is a pen that regularly sells for from one dollar to one dollar and fifty cents in the stationery stores. But you can get one, free, by sending in a new subscriber. You'll find lots of use for a good fountain pen and you'll not be able to do without one after using it for a while. Better send in that neighbor's subscription and get a real fountain pen.

Contents, March, 1912

A Penny Saved

Do you turn to the page of "Current Heavy Hardware Prices" every month? Get the habit of looking over these items every month and see how the market is going. You'll often find a chance for saving told of in those columns. And one item will sometimes save you the subscription price of the paper. Those quotations are as reliable as it is possible to make them by means of a system of correspondents in the big cities. Just glance through the items now and then—make it a regular habit every month.

About Ten-Question Department

When we installed this department and featured ten questions for the month we had no idea that this would prove to be such a big success. The numerous letters we have received from readers since we have started this new department has, however, shown us that there is a big call and demand for something of this kind. A recent letter, for instance, from Mr. Wm. Frenya of New York State. Mr. Frenya says, "I am so much interested in the new question and answer department of THE AMERICAN BLACKSMITH that I didn't think it was just not to give it a little praise. I think that every blacksmith in the land can get some benefit from it and hope you will keep the good work up."

We are, of course, most desirous of making this department just as valuable and as practical as possible. We want suggestions, criticisms and recommendations from readers. We want to know how we can make this department more valuable and more useful to you. If you desire questions and answers published on certain subjects, do not hesitate to let us hear from you. We are always willing and very anxious to have suggestions from readers for any department in the paper.

In this connection we wish to make the suggestion that we are sure will make these questions and answers of more value to you. Our suggestion is this: that all readers write out the answers to the questions each month, not necessarily for publication, but to get a more vivid idea of what they do or do not know on the subject being discussed. They can then compare their answers with the answer published the following month. In this way readers can get an exact idea of what they need to know and what they should study during their spare time.

ACT I

ACT II

Pictures with apologies to Farm Implement News

ACT III

ACT IV

THE SMITHS

A DRAMA OF EVERY-DAY LIFE, IN FOUR ACTS

SYNOPSIS

ACT I—Scene: In any county. Contention, discord, petty conflict. No thought of profit.

ACT II—Profit in danger. Realization. Common interests demand united action.

ACT III—The rescue. Unity demonstrates its strength. Co-operation saves the day.

ACT IV—Harmony. Safety of profit assured. Satisfaction, gratification, remuneration.

The Business Side of Smithing

The Principles of Cost-Keeping

THE man who wants to succeed in these days of sharp competition cannot afford to estimate anything—he must know. The old methods of guesswork must give way to modern methods of clear, actual knowledge on costs. No business can be safely and successfully conducted if every cost which enters into it is not known. And to know your costs as you should you must keep an accurate record of every transaction. You must not, in fact you cannot, afford to guess at anything. And these records must be kept conscientiously and persistently. Not one day must go from the present into the future without adding its particular figures to the business for the year. And these records must include every cent paid out, every cent taken in, every credit transaction, every note, every bill, in short, everything and anything done in the business and affecting the business.

Expenses

Under this head are two divisions: Fixed expenses and incidental expenses. Under the first division of fixed expense comes salaries, rent, interest on investment, insurance, water, lighting and fuel. Under incidental expense comes the cost of the books for keeping business records, the slips and tags used by many smiths for tagging jobs through the shop, letterheads, billheads, envelopes, postage, advertising, telephone, subscriptions to papers and magazines, donations and, finally, losses of all kinds.

Fixed Expense

Now let us define the various items under fixed expense. Under salaries the first item should be the proprietor's or owner's salary. Some readers will say that as owner they need not charge the business with a salary for themselves, as they receive their pay in the profits. This is wrong, however. The profits from the business are the dividends upon the investment, and paid after the expenses have been met. The owner's salary is a part of the cost of doing business, and was nothing whatever to do with profits. It should be charged to the business as a fixed expense item.

If the business is a partnership, the salary of each partner must be charged to the business. The salary should be based upon the work each man does, the same as though he were an ordinary employee, though it is supposed that the owner is worth more to the business than anyone else employed.

The next item is rent. This figures in the cost of doing business, whether or not the proprietor of the business owns the shop building. If the proprietor rents the building he will naturally charge rent, on his books. However, if he owns his own shop he is more likely not to charge the business any rent. He should, however, make the business pay him rent just as though someone else were running the business. And with the rent he should pay taxes, make needed repairs and make improvements to the building. The rent charged should be fair—just what the owner would charge another person for the same space and accommodations.

The third item of fixed expense is interest on the investment. This, somewhat like the proprietor's salary, is often left to care for itself in the profits of the business. The owner should, however, receive a certain amount for the money he has invested in his stock and equipment. And this amount should at least equal what the owner would receive for his money if he were to let it out at interest in some other manner.

Insurance must include the cost of insuring everything but the building. It must include insurance on stock, equipment, machines and everything used in the business and protected by insurance.

Water, lighting and fuel costs are, of course, too apparent to need explaining.

Incidental Expense

A business man cannot know his cost of doing business unless he knows what his incidental expenses are. Not one penny for postage must be paid out without recording it in the expense book.

First under incidental expense comes the cost of the books for keeping an accurate record of the business. These books should be of a size consistent with the size and magnitude of the business. For a small smithing business, which the proprietor cares for alone and without help, small books only are necessary. And in this case it seems rather foolish for the smith to install an elaborate system of job tags, work tickets and the like. Two books and a pad of good paper or, better still, a file such as may be secured at any store dealing in business stationery. This file has a set of divisions designated by the alphabet and held loose to a wood backing by large hinged staples or wires. This file could be made to take the place of day book, ledger, sales and expense books. And with this system, items could be charged directly to the customer's ledger account, instead of making a day-book charge and then transferring these charges to the ledger. Of course it would be necessary to keep a day memorandum in order to know the amount of business done each day.

This system may not work, however, in a large business where a number of men are employed who are each doing some work on each job that enters the shop. Of course, a bookkeeping system or, more correctly speaking, a cost-keeping system may be just as simple or just as elaborate as the business smith desires; from the simple file system for the one-man shop to a

complete set of books with separate forms for each department such as is necessary for the modern establishment which beside a general smith shop includes a garage and auto and implement agency.

But to return to the incidental expenses. If a typewriter is used, this is accounted for under incidental expenses, as are also the ribbons, carbon sheets and the like, used on the machine. Of course all billheads and printed forms of all kinds are included under incidental expense.

Under the head of advertising must come not only the cost of

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Mr. A. W. Baker

Rec. by J. P., Feb. 1, 1912

Finished April 1, 1912

General repairs where needed

Stripe fine line red

TAG NO. 1—A. THE FRONT OF THE TAG CONTAINS GENERAL DIRECTIONS

newspaper advertising, but all other advertising, such as letters, circulars, handbills, road signs, postage and envelopes to send out announcements, cards in programs, space at fairs, cigars presented to customers, and any and all moneys spent to create business and to influence people to trade with you.

The cost of telephone is of course charged to incidental expense. There, too, must be charged the subscriptions to papers and magazines. However, if they are subscribed for personally by the smith shop owner and paid for personally, their cost must not be charged to the business. If the trade paper is ordered sent to one or more employees the cost of them is of course charged to the business.

Many smiths make donations to various institutions each year, and these if taken from the business must be accounted for. If the donations are made personally by the smith they are not, of course, charged to the business.

Finally there are the losses—no matter of what nature—they must be charged to expense of doing business. Uncollected accounts, stolen stock, lost tools and all similar losses are charged under the head of incidental expense.

From the foregoing it is readily apparent that incidental expenses are very important in arriving at a true knowledge of the cost of doing business. And while designated as incidental they are by no means minor expenses. Many a business ship has been wrecked on the rock of incidental expense.

System In the Smith Shop

H. N. Pope

Everything runs smoothly when there is some system used in attending to details. For we all know that the big things are simply made up of a number of small matters. The smith who puts his tools in their proper places when he has finished using them is most likely to carry out similar systematic ideas in other and more important matters.

Now to get down to a working system for taking care of the jobs that come to the shop—I have used to good advantage a system of tagging for all repair work. In the examples shown, Tag No. 1 is attached to the running gear. The front side A should bear the customer's name and address, if necessary; the date upon which the vehicle was received; the date upon which it should be finished, and the list of repairs to be made. At B is shown the back of the tag. This side should contain a list of the parts that came with the vehicle, for it is not unlikely for a customer to insist that certain parts accompanied the vehicle, when they are later found reposing in the customer's barn. One customer, for example, was certain that his carriage came in with side curtains on it, and to satisfy him new ones were made. When the job was delivered the old side curtains were found nicely folded in his barn.

Tag No. 2 is for attaching to the various parts of the job. This may simply contain the customer's name or, if special work is to be done on the part, it may outline that work.

The Business Side

Dayton O. Shaw

When I first took charge of the blacksmith department of a machine shop the buyer would come in and say, "You had better look over your stock and see what you need. The salesman is here, and I want to give

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Shafts

Curtains

Straps, body

Straps, shaft

Miscellaneous

1 pair gloves

1 Tie Strap

TAG NO. 1—B. THE BACK OF THE TAG SHOWS WHAT CAME WITH THE VEHICLE

him the order now." When a man is tremendously busy it is annoying to have to leave one's work and go over a large stock to get a few articles, and then the chances are that he will miss some. I had this experience a couple of times and then I made out a list as on page 135. It is simple, but perhaps some brother has a better one. However, it has saved me a lot of trouble. It is quite a job to list a large stock, but it pays well. Take a blank book, list on the first page, for instance, steel. Then you can carry your figures across the next page. Then skip three or four pages and list iron, and so continue until you have everything down. Now, when the right hand page is full of figures,

tear it out, and you have another line to use.

STEEL

Size	Shape	Quality	Quantity	
1"	Octagon	100 C.	2 bars	0
¾"	Square	80 C.	3 bars	0
$\frac{3}{16}$" x 2"		Spring		0–4
2"	Round	Annealed	1 bar	
1¼" x ½"		High Speed	T-bar	

You will note in the above schedule that the figures at the left hand indicate the size, the figures under quantity indicate stock on hand at listing. The figure "0" signifies out of that stock, the next figure "0-4" (O with a dash) signifies that we are out of that stock but that it has been ordered and have had four bars delivered. Now to make this plain. When I get out of one article I put down an "0" at the right hand of that line; when the article is ordered, put down a dash and when it is delivered put down the quantity. Then, when you run out of stock again, commence with the "0", etc. The left hand shows the size you carry in stock and the right hand shows how much you have on hand. Many times through the day, shop men and outside customers are inquiring for different stock sizes. How much better to go to your desk and tell at a glance, than to go to the iron room and hunt around for, anywhere from ten minutes to an hour.

How To Figure Costs

The chalk talk by Mr. John Massey, of the Massey Iron Co., and Mr. W. M. Sasher, of Beck and Corbitt Iron Co., as given at the recent Kansas State Convention of Blacksmiths, should interest every man interested in smithing. It seems especially timely to publish these figures in this issue, as we are featuring the business side this month.

The prices of woodstock are all at cost at St. Louis. Many small items are not included in the figures and should be charged for as extras, such as bolts, nuts, washers, changing the bend of circles and of shafts and poles, handling vicious horses, etc. Labor is figured at 30 cents per hour, which is low. It would be better to figure time at 40 cents.

The first division of ¼, which is 25 per cent, is to get at the overhead or "up keep" cost. By actual count in the average shop this is not too much, and includes rent, use of machines, wear and investment in tools, borax, files, etc. This added to the cost of materials, freight, paint and labor gives us the actual cost of a job to the blacksmith. He cannot live on air alone, so a profit must be added to this cost; and the

O

Mr. Baker

TAG NO. 2. THE SMALL TAG IS ATTACHED TO VEHICLE PARTS

second division by ¼ is to obtain 25 per cent of the cost for a profit; and this added, gives the price that the shop should charge for the work.

Of course, odd cents can be avoided, and when a job comes to $2.03 call it $2.00, and when $1.43 call it $1.50.

In the ten articles figured is shown how the cost and selling price are obtained. From these examples the cost and selling price can be found for any job.

No. 1

Buggy pole	$1.75
Freight	.25
Paint	.20
Labor, 2 hours	.60
¼	$2.80
Overhead cost	$ .70
¼	$3.50
Profit	$ .88
	$4.38

No. 2

Buggy shaft	$ .75
Labor, 1 hour	.30
Paint and leathers	.25
¼	$1.30
Overhead cost	$ .32
¼	$1.62
Profit	$ .40
	$2.02

No. 3

Buggy spoke	$ .05½
Labor, ½ hour	.15
Paint	.05
¼	$ .25½
Overhead cost	$ .06½
¼	$ .32
Profit	$ .08
	$ .40

No. 4

1 set No. 4 shoes and toes	$ .40
Nails	.05
Labor, 2 hours	.60
¼	$1.05
Overhead cost	$ .26
¼	$1.31
Profit	$ .33
	$1.64

No. 5

Pr. hind hounds	$ .50
Freight	.20
Paint	.15
Labor, 2½ hours	.75
¼	$1.60
Overhead cost	$ .40
¼	$2.00
Profit	$ .50
	$2.50

No. 6

Front bolster	$ .70
Freight	.20
Paint	.10
Labor, 2 hours	.60
¼	$1.60
Overhead cost	$ .40
¼	$2.00
Profit	$ .50
	$2.50

No. 7

Wagon axle finished	$1.35
Freight	.35
Paint	.15
Labor, 5 hours	1.50
¼	$3.35
Overhead cost	$ .84
¼	$4.19
Profit	$1.05
	$5.24

No. 8

Oak wagon tongue	$1.40
Freight	.40
Paint	.20
Labor, 2 hours	.60
¼	$2.60
Overhead cost	$ .65
¼	$3.25
Profit	$ .81
	$4.06

No. 9

Wagon spoke		$ .08
Paint		.05
Labor, ½ hour		.15
	¼	$ .28
Overhead cost		$ .07
	¼	$ .35
Profit		$ .09
		$ .44

No. 10

Wagon felloe		$ .12
Paint		.05
Labor, ½ hour		.15
	¼	$ .32
Overhead cost		$ .08
	¼	$ .40
Profit		$ .10
		$ .50

Guarding Against Impecunious Deadbeats

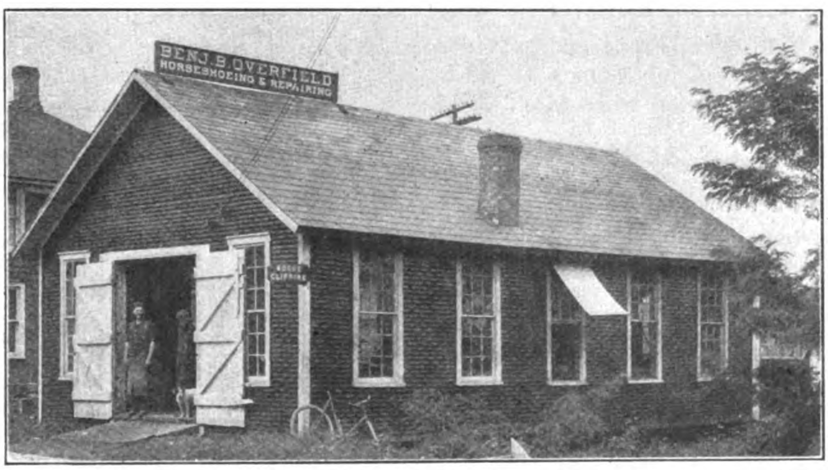
Elton J. Buckley

If the merchant could be sure of his accounts, it is probable that the credit business would be preferable to the cash business from almost every standpoint, particularly since it makes possible the doing of a much larger business than the strictly cash business which is necessarily restricted.

Being sure of his accounts has proven almost an impossibility, particularly with the business man whose trade is among that class of consumers who own nothing but the personal property in their houses. Under the laws of practically all States consumers of this class are unreachable. Some few States provide a way of attaching their wages, but mostly this procedure is attended with much difficulty and heavy costs. With large accounts it may pay to follow it, but with small ones it is usually impracticable, since the whole amount would be eaten up by attorney's fees and court costs long before anything was obtained.

Almost every family has sufficient household goods to cover a fair-sized bill; but the difficulty is that when sued they claim exemption, as they can do under the laws of practically all States. This exemption ranges all the way from $200 in New Jersey to several hundred dollars in the western and southern States, and it at once sweeps all the debtor's small assets out of the creditor's reach. Another favorite plan is to have some third person claim the goods. It is obvious that if the household goods or personal property belong to somebody not a party to the suit they are not subject to execution.

A case was brought to me recently in which a bill of ninety dollars was owed by a householder of apparent abounding prosperity. He manifested perfect indifference as to what was done in the case, but judgment was obtained, and a constable started out with a writ of execution to see what he could get out of the richly-furnished house in which the debtor lived. The officer made the levy in the regular way, but immediately afterward was confronted with a sworn claim of ownership as to the household goods by the debtor's aunt. To make a long story short, investigation proved that the very lease of the house was in the name of another, the dishes from which the debtor ate were his aunt's, and so far as the plaintiff's claim was concerned the defendant stood legally naked, owning not one cent's worth of attachable property.



A POWER EQUIPPED SHOP OF PENNSYLVANIA

There are hundreds of such cases. In all of them the creditor is as helpless as a new born babe.

Reasoning upon the theory that if an applicant for credit could be placed in a position where he could not claim exemption as to his household goods, thus leaving subject to the merchant's levy enough property to satisfy a moderate bill, considerable dead-beating of this kind would be prevented. I worked out a plan for a Pennsylvania association some years ago which has been used throughout the State with extremely good effect. Where it has failed, the merchant was usually at fault in neglecting to use sufficient care.

The plan comprehends securing the signatures of every applicant for credit—husband and wife both—to a certain agreement before any goods are supplied on credit. The form of the agreement is as follows:

This agreement made this........ day of......., 1912, between John Jones, party of the first part, and........ (husband) and .... (wife) parties of the second part, witnesseth:

That .... (husband or wife, as the case may be) covenants and warrants that .... (he or she) is the sole owner of the personal property and household (or other) goods now on the premises at...... ....; making said statement of ownership as a representation for the purpose of obtaining credit from the party of the first part.

That the party of the first part, in consideration of these premises, agrees to extend to the parties of the second part credit to the extent of $........ per week (or month).

That the parties of the second part, in consideration of the said extension of credit, which they hereby accept, agree to pay all bills incurred at the business place of the party of the first part not later than........

That the said parties of the second part, in further consideration as above, also agree in case it becomes necessary for the party of the first part to bring any action by reason of any violation of any of the within covenants by the parties of the second part, to waive all rights of exemption which they may enjoy under the Constitution or Statutes of the State of ...., and the said parties of the second part do hereby waive all exemption rights as aforesaid.

In Witness Whereof, the parties have hereunto set their hands and seals, this .... day of ....

....................(Seal)
....................(Seal)
....................(Seal)

Witnesses,
....
....

The strength of this agreement lies in the fact that it first places the owner of the household or other goods on record with a positive claim of ownership, and compels him or

her to explicitly state that the claim is made for the purpose of obtaining credit. If later any claim is set up that somebody else owned the goods at that time, a case of criminal false pretense is made out, and a warrant could issue for obtaining property under false pretenses. Naturally, there is nothing to prevent the debtor from transferring the property to someone else after the agreement is signed, but he could then be pursued for transferring property to defraud creditors.

The main point is, of course, the waiver of exemption. A husband and wife signing this agreement can be sold out for a bill, even if they own less than one hundred dollars' worth of household goods. The moral effect of this condition is much strengthened by explaining this to the debtor after he or she has signed the agreement.

In cases brought to my attention where this plan has failed, it has usually been because the merchant neglected to secure the signatures of both husband and wife, or failed to fill in all the blank terms, so that the agreement became a meaningless document. I have never known the agreement to be successfully attacked and have every reason to believe that a careful, business-like use of it will prevent ninety per cent of all the bad debts incurred with this class of consumers.

Some business men have told me they felt delicate about asking applicants for credit to sign it. If a merchant feels too delicate to protect himself against a debtor as to whom, without it, he would be wholly helpless, I am afraid there is not very much hope for him.

(Copyright by Elton J. Buckley)

Pittsburgh To Shoe Its Own Horses

City Councilmen have figured out that the shoeing of the city horses cost $34 a horse a year. Director H. B. Oursler declared that was too much pay.

"No firm in the city that uses horses can get its animals shod for as little as $34 a year," insists former Councilman W. J. Moore, the Oakland horseshoer. "I could make contracts right now to shoe hundreds of horses for $34 a year each, if I would. The average horse belonging to business firms costs its owner from $50 to $60 a year for shoeing and refitting of shoes." He continued:

"The statement that the city is compelled to send horses to be shod, whether they need attention or not, I know to be incorrect. It is possible that a horseshoer who does city work, finding himself with slack time on hand, might telephone to the city stables and ask that horses needing attention be sent.

"A horseshoer who is the right kind of a man thinks not only of the money he can make, but of the animal's comfort. Any horse used in city work ought to have a new pair of shoes every other month, and have the shoes refitted the next month, if its feet are to be kept in condition. It is very probable that the horseshoer keeps track of the last time when his regular customer's horses were attended to and, if he thinks it time to refit or to reshoe, that he telephones and inquires why the horses are not sent.

"Horseshoers now charge $2.50 for shoeing a horse and $1.50 for refitting shoes. Thirty years ago, when I learned the trade, they got $2 for shoeing. In those days the men got $2 a day; now they get $4. Material is much higher now than it was then. If you, for example, are a regular customer of mine, and you bring a horse that has something the matter with its feet, I may spend an hour examining and treating it with no extra charge, so that it is not only the work of putting on a shoe that the horseshoer must do.

THE NEBRASKA BLACKSMITHS, HORSESHOERS, WHEELWRIGHTS ASSOCIATION, IN CONVENTION AT OMAHA

"Two $4 men can shoe an average of six horses a day. The city has 820 horses. Counting three horses to a man, 12 men would have to be steadily employed to shoe these horses, an average of 36 animals a day. That would take $16,000 in wages alone for a year."

Mr. Oursler talks about automobiles with forges—"Flying anvils"—"It would cost something to keep up the cars, which ought to be added to the cost of wages for the men, besides material and the interest on the city's investment. The men would not be allowed to take the portable forge into the city stable, hence the work would have to be done outside, in the street or alley. Where can the city find the horseshoers, real mechanics, who will shoe a horse out in the rain or in freezing weather? A certain kind of horseshoer might consent to work under those conditions, but the kind that the average master horseshoer employs would not take the job.

"No, the city is getting off lucky if it pays $34 a year to shoe each of its horses. Several persons have told me they would gladly contract with me to attend to their horses for that price; not seriously, of course, for

they know it costs them $50 to $60 a horse, if they want the animal kept in good condition."

Some of the Essentials In the Wise Purchase of a Tool Steel

From *Tool Steel and Its Uses*
By J. C. Scott

The first consideration in the purchase of a tool steel is naturally the result to be obtained by its use. In the case of an automobile axle, for example, this implies a factor of safety which will preclude the breaking of a single axle. If this factor is too low, the steel used is too expensive no matter how low its initial cost per pound. It is not sufficient to make sure that nine hundred and ninety-nine out of every thousand axles will stand whatever strain is put upon them; it is absolutely imperative that the one thousandth axle shall be just as good as any one of the other nine hundred and ninety-nine. This sounds like a truism, and yet any one who is at all familiar with the motor truck proposition will realize that some manufacturers have been unable to solve this particular problem.

A second point which should be considered carefully before steel is purchased is the heat treatment to which it must be subjected before it can be used. The astounding lack of uniformity in machine-shop methods and practice is so great that a steel that is successfully used in one shop is declared entirely unsatisfactory by another.

The reliability of the maker is a third essential to success and its importance cannot be over-estimated. The correct formula is not in itself enough to insure success. It is also necessary to have the best possible raw material; strictly pure chemicals, containing no adulterations; competent mill men thoroughly conversant with the making of tool steel and the closest possible inspection before the material leaves the mill. Only in this way can perfect uniformity be assured.

From the above paragraph it will be noted that no amount of mere theoretical knowledge will enable the manufacturer to escape the personal equation. Practical experience and integrity are absolute requirements all along the line. The factor of safety must be so large that the initial quality of the steel before the treatment, and the simplicity of the treatment itself will make up for defects in machine shop practice.

We spoke of the importance of the factor of safety in the case of automobile axles. Our special vanadium automobile steel has been worked out with a view to meeting all requirements not only of present practice but of the future. And although this steel has been used by one manufacturer for the axles of fourteen different makes of automobiles, we have never yet heard of a single broken one. Now it so happened that one of this manufacturer's customers wrote him recently saying that they could not continue to use the inch-and-a-quarter axle which had thus far given them perfect satisfaction, but would have to increase the size to one and nine sixteenths.

The manufacturer being convinced that this automobile steel would meet every requirement, whatever it might be, insisted upon a practical test. In this test, made on a White-Souther endurance machine, the steel was compared with an inch and nine-sixteenths cold-drawn shafting.

The shafting was first subjected to a fiber-stress of five thousand pounds, under which it endured two million revolutions and then broke. The test was next applied to one of the regular inch-and-a-quarter rounds of special automobile steel from which the company makes its axles. After this had continued for fifteen hours without any visible results, the strain was increased to thirty-five thousand pounds, and the test resumed. After one hundred and forty-two hours of continuous running, during which the steel resisted over eleven million revolutions, the attempt to break it was given up as impracticable.

Test of Sample of Chrome Vanadium Steel From Inter-State Automobile Company

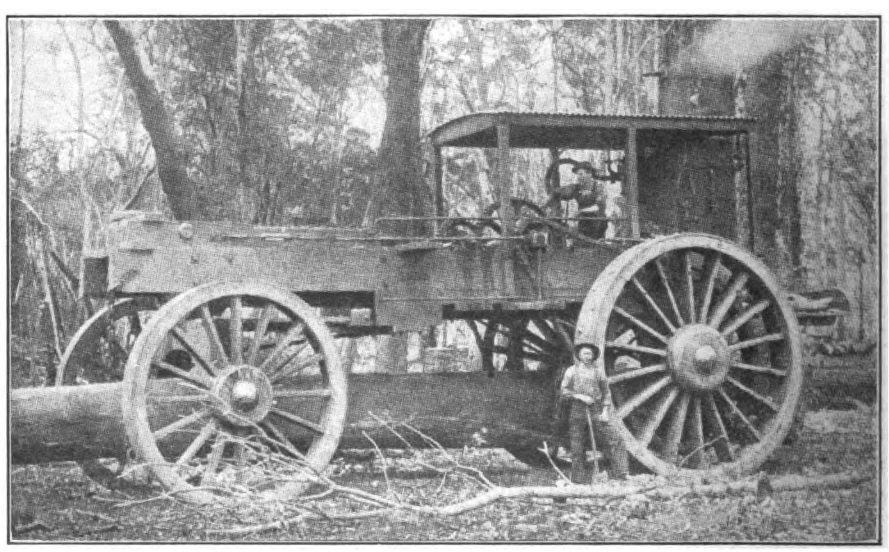
Analysis

Sulphur	.034
Phosphorus	.025
Manganese	.760
Carbon	.460
Chromium	1.265
Vanadium	.108

Endurance Test
(Test made on White-Souther endurance machine)

Load in lbs.	100
Fiber stress lbs. per sq. inch	35,338
Total revolutions	11,069,700
Total hours	142

After running this length of time



From Australian Coach Builder and Wheelwright
LUMBERING IN WEST AUSTRALIA. A STEAM CARRIER CONVEYING LOGS FROM FOREST TO MILL

it was concluded by The Inter-State Co. that this was a sufficient evidence of the quality of the material, and the test was ordered stopped. A tensile test was then made of the specimen in such a manner that the sample might break where the strain had been applied in the endurance test. However, the breakage was not at this point.

Physical Test

Tensile strength	167,950 lbs. per sq. in.
Elastic limit	152,860 lbs. per sq. in.
Elongation in 2 inches	12.5%
Reduction of area	36.9%
Scleroscope hardness	48.

It is quite possible that some other maker might come forward with a steel which would resist one hundred and seventy-five thousand pounds to the square inch, and that the manufacturer might consider it an argument of superiority, without realizing that our steel could easily be hardened to withstand a strain of two hundred and twenty-five thousand pounds if this were advisable. As a matter of fact, the one hundred and sixty-seven thousand pounds is ample to meet any strain that will ever be put upon the axle, and greater hardness would be secured at the expense of that very factor of safety of which we have spoken. It is surely better to pay a little more for steel whose initial quality is so high that you do not have either to depend upon some special treatment for results, or to reduce the margin of safety by sacrificing ductility for sake of a tensile strength which is excessive.

Some Labor-Saving Stunts In a Railroad Smith Shop

By Benton

"Why don't you come out and see Joe Grine, some day?" questioned Tom Kidd, foreman of the brass shop. "I think he's got some machines and things that might interest you."

"Think I will, Tom" and so a few days later found me in the big forge shop of the New York Central Lines at Depew, New York, talking to Foreman Joseph Grine.

The equipment at this shop consists of 27 down draft forges, 11 oil furnaces, two Bradley hammers (one 300 pound and one 200 pound) one 5,000-pound steam hammer one 2,500-pound steam hammer and one 1,000-pound steam hammer. The working force number sixty-one men. The work is practically the same as that turned out at any large railroad forge shop.

An idea of one line of work may be had from Fig. 1. This is from a rather poor photograph of Mr. Grine's sample board. This shows some of the work done on the 3-inch Acme forging machine. The large nuts shown are 6½ inches across the hex. with a 4-inch tap and finished 3 inches high. The blank is bent round from 5 by 1-inch stock, placed in the die of the bulldozer and finished in one operation.

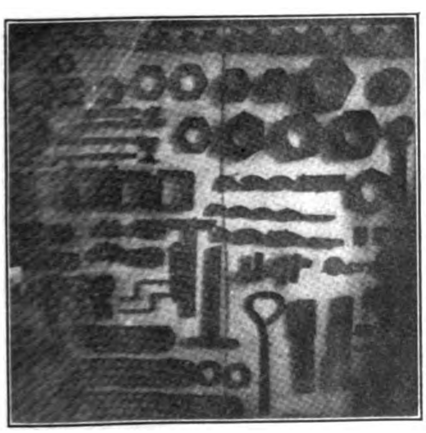


FIG. 1—A SECTION OF THE SAMPLE BOARD

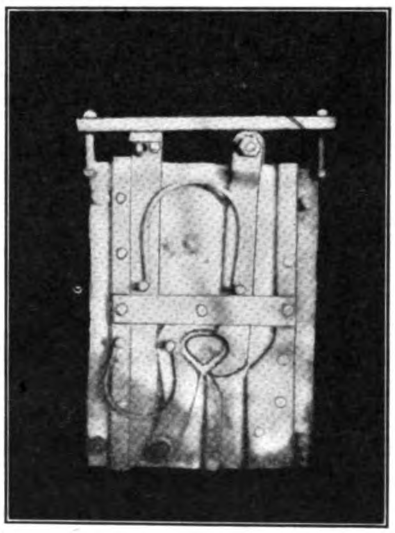


FIG. 2—THE HANDLE FORMING PLATE CLOSED

The steam chest relief valve shown on the board just under the twist drills is 3½ inches in length through the stem and 2¾ inches across. This is formed from ¾-inch round stock. The stock is heated and placed in bulldozer, and the stock gathered. It is then heated again and finished to the size above mentioned.

The guard rails, both the long ones of 15 feet and the shorter ones of 10 feet, were formerly heated in the forge and bent by hand. Now with the aid of an air bulldozer, designed by Mr. Grine, the operation of bending is greatly simplified. The rails are heated, placed between the bending dies of the machine and bent to the proper degree in one operation of the machine. Both the 15-foot and also the 10-foot guard rails are bent in this manner.

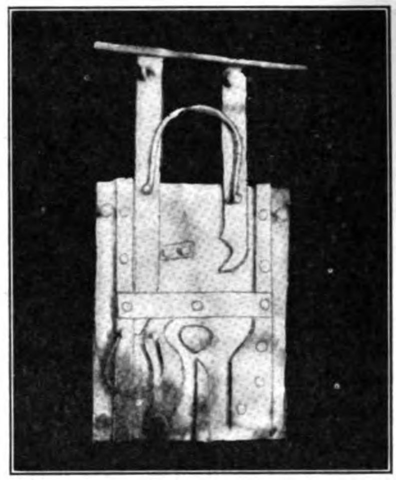


FIG. 3—HERE THE PLATE IS SHOWN OPEN

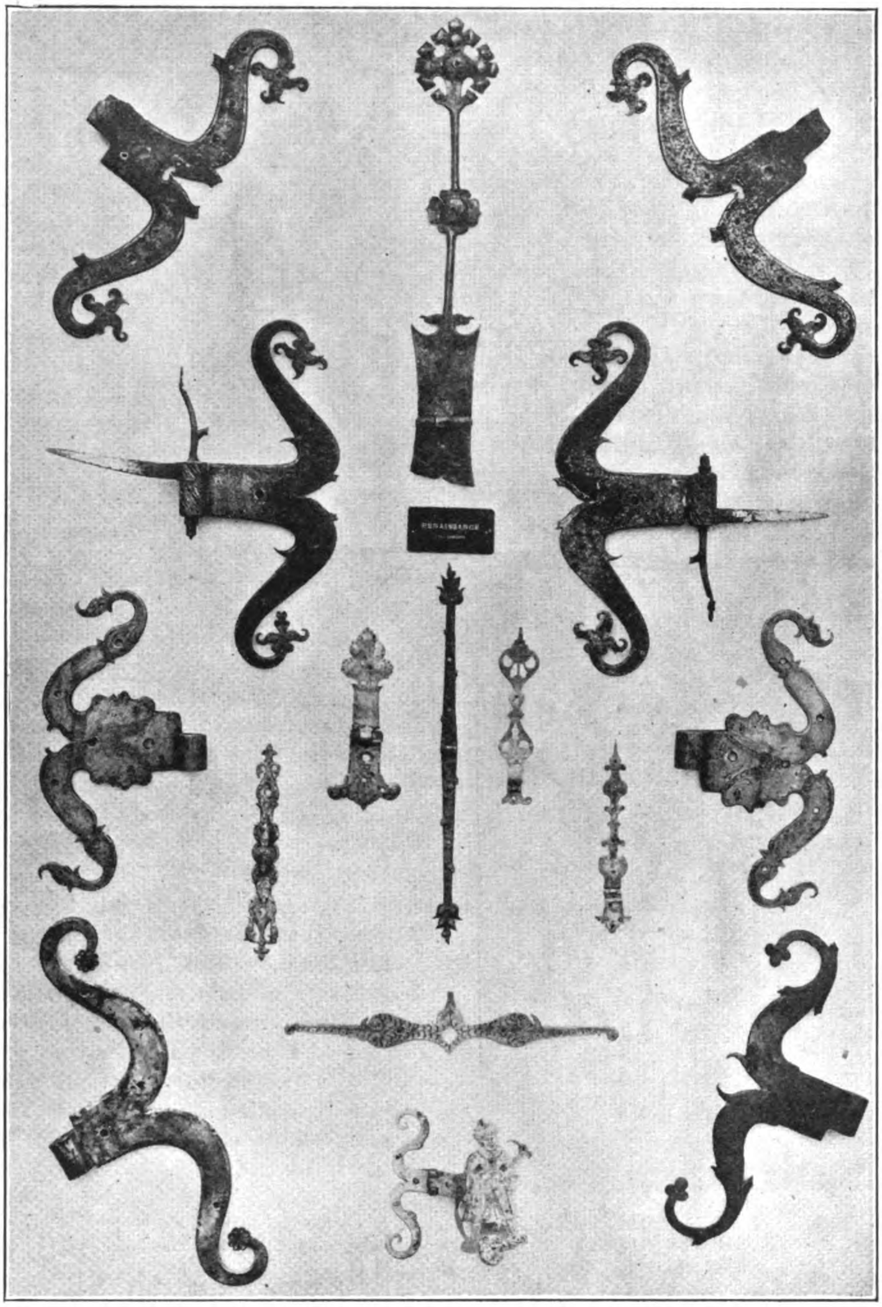
In Figs. 2 and 3 are shown the forming plate used for bending the handle end of the rake used by locomotive firemen. These handle ends were formerly heated in the forge and bent by hand. Now the end is placed in the forming plate and bent cold. Fig. 2 shows the forming plate closed, while Fig. 3 shows it open.

Oxy-Acetylene In the Railroad Smith Shop

George Hutton

Oxy-acetylene welding has been demonstrated enough to prove to us that it is beyond the experimental stage, and its uses in railway smith shops are unlimited. There has been, and is at the present day, more or less skepticism regarding oxy-acetylene welding which is unworthy of us in this day of advancement. We have seen this method of welding and cutting applied to boiler repairs, and some wonderful work has been accomplished.

I venture to say that if this method had been tried out as extensively in the smith shop work, every important railroad shop in the country would have an outfit. In the smith shop we would not have the same



SEVERAL HAND FORGED HINGES OF ODD DESIGN FROM THE SEVENTEENTH CENTURY

difficulties to contend with that we have in the boiler shops. We all know that any kind of welding on boiler work is difficult on account of the expansion and contraction, which in the smith shop would be nearly eliminated.

There have been failures with oxy-acetylene welding, very naturally, but we must not forget that there have been many failures with oil welding Thermit welding, also plenty of failures in the old reliable forge and anvil method. There has never been a new method introduced, especially in welding, which got the fair chance it should. Would any of us put the ordinary handy man at a forge to make a weld on an important piece of work and expect something good? That is what we seemingly expect from any of the new methods of welding, whether it is Electric welding, oil welding or Thermit welding. Ten chances to one, the novice is not sure if he has got a proper welding heat, and all the teaching and coaching you may inspire him with will never teach him as will an actual practice and experience. Therefore, we must be enthusiastic and get the man behind the burner as interested as we are, ourselves.

There are a great many of us ready to condemn oxy-acetylene welding because it looks like a soldered job and many believe it cannot be hammered. This is wrong in many cases, as it can be hammered enough to give the proper laminitations covering 75% of the job in the smith shop. I have noticed most of the failures with this method have been by not having the original piece of work hot enough. This need not be, with such an intense heat as acetylene gas and the right man behind the burner. This gas applied to heating iron or steel is ideal for welding, as it is under the control of the operator at all times. I notice in some of our shops and building yards some wonderful work being done with this method,—why not in the railroad shop?

A Comparison of Hot and Cold Tire Setting Methods

C. H. Moule

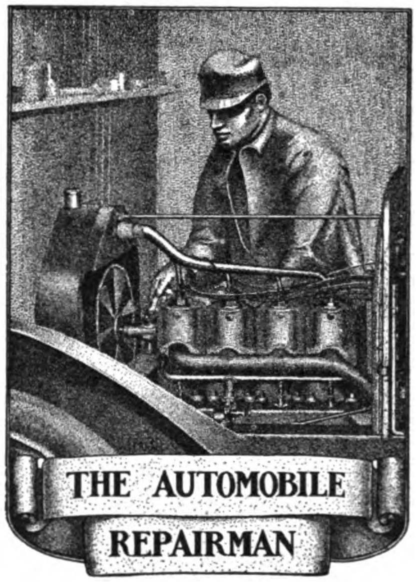
Since 1868 when I started in business I have set all kinds of tires by both the hot and cold system. I do not understand why there should be any discussion, since both methods arrive at the same result,—they both shorten the tire. Now a cold tire setter will not perform miracles, and the smith who expects them will be very much disappointed. We have had a No. 4 Brooks cold tire setter for the past three years and have set a large number of tires with it. We warrant the work to be all right or no payment. We also have a hot shrinker, and when a tire setting job comes in we give the party the choice of the hot or cold system, the price being the same. The majority of them want the cold process, probably due to the fact that they can get it done quicker that way. A customer who has watched us set the tires cold never wants them set hot again. In fact, we have had tires come for twenty miles to be set. I consider this proof of the results of the cold process.

Some blacksmiths when purchasing a tool like the cold tire setter expect that it is going to do away with the hot process altogether, but that is a mistake. There is no edge grip cold tire setter made that will set all and every tire that comes in the shop. The tire must be strong enough to

withstand the grip keys or they will simply crush the tire and will not upset it. We never undertake to set a tire cold unless it is thick enough to stand up under the key pressure. Now I claim that the cold process is better for many reasons, one of which is that there is no guesswork about it. In a wheel with sixteen spokes there are thirty-four joints that you have to take into consideration. Now there is no known rule or method to determine just how much space to leave in the rim to bring up those thirty-four joints. You simply have to guess at it, which is all right, providing you guess right, but if you don't, the only thing left for you to do is to knock your tire off and guess again. In cold setting if you have not guessed right the first time it is very easy to saw out some more and draw your tire up a little more until it is right. When you set a tire hot, however, if you happen to get it a little too small (and a very little will make it too tight) the wheel has to take all there is in the tire, anyway. In cold setting you can watch the wheel and when all the joints are up and the tire is tight why stop right there and you have a job that cannot be done better by any other method.

Every new tool for the improvement of our work has always to overcome a lot of prejudice, especially from the ones most benefited. I can remember when the hot shrinkers first came out. Men argued that when a tire was upset instead of being cut and welded that the first time the wheel got wet after the tire was set that the tire would pull out again at the place it was upset. This is about as sensible as some of the talk about cold tire setting. The cold tire setter is a splendid tool when used properly, and has come to stay, and it will not be long until you will find them in every shop where there are tires to set.

NOTE:—This subject has received consideration by both users and non-users of cold tire setters. It has been discussed from practically every viewpoint. It is a subject in which every reader seems to be interested. If there are any arguments, for or against, that have not yet been presented we shall gladly devote space to them, so that our readers may have a fair, impartial and full discussion of this subject. At a near date we hope to publish a review of this subject, written by a man competent to analyze the arguments that have been presented. That article should answer "Should I Buy a Cold Setter?"—EDITOR.



Non-Floating, Partly Floating and Full Floating Rear Construction

J. N. BAGLEY

In order that we may get an understanding of the different axles, we must first define the term "floating," as applied to axles. In order to do this we must bring in other points relating to the various types of axles, such as mechanical difference and points in relation to bearing equipment, as well as other features of practical value to the user of the car.

Definition of Terms

When we refer to the "rear axle" we mean the entire cross member of rear construction, including the housing containing the working parts, driving shafts, differential gear, as well as the hubs. The propeller shaft, while many times included in this term, will not be taken into consideration in discussing this term. The axle consists of two shafts. These are the parts which "float." To what extent it floats will depend on its construction. The main shaft may be floated to such extent that it will be relieved from all working forces in any direction in any plane through its axis. The above mentioned forces can take one of two forms, either a radical pressure by contact with the bearing itself or a bending strain, due, for instance, to its outer end being rigidly held to the wheel spokes and compelled, to a certain extent, to resist their side motion. In either case, regardless of make up, there must be a slight pressure in the direction of the axles' axis or in other words a straight end thrust, sufficient to hold the main shaft in place laterally. This force in every instance varies, and in the case of the full floating axle is inconsiderable, being only sufficient to overcome the inertia of the shaft itself. In discussing the axles we will not take up this particular point, as it is not necessary to describe them in a technical manner.

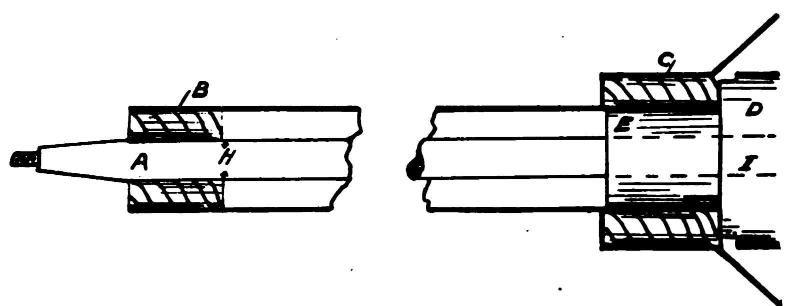


FIG. 2—THE TYPE KNOWN AS SEMI-FLOATING

Live Type

The first axle that came into general use was known as the "live axle" a term which distinguishes it from the common "dead axle" that we have on a buggy or a wagon. In this construction the main shaft is supported by a bearing at either end, as shown in Fig. 1 at B and C.

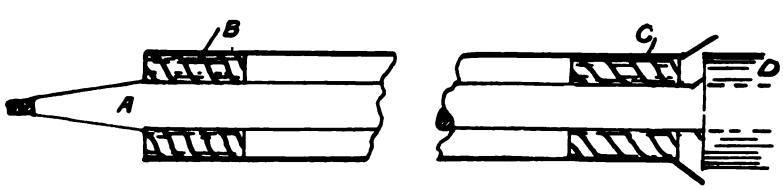


FIG. 1—THE LIVE AXLE EQUIPPED WITH ROLLER BEARINGS

It is readily seen from the drawing that the radial load is transmitted at B and C; the axle A extends beyond the housing to permit the wheel to be fastened, while the other "semi-floating" type, while at the outer end the same idea is carried out, making the wheel carry the load instead of the shaft. This type is widely used both in this country and

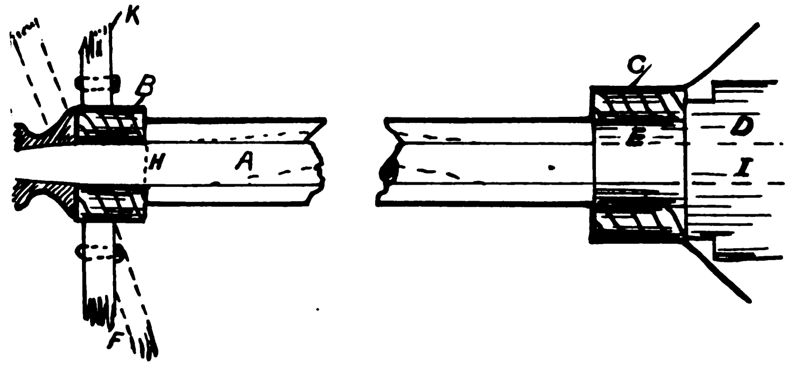


FIG. 3—THIS TYPE IS CALLED THE THREE-QUARTER FLOATING

end is made fast to a small gear contained in the differential case D. In this type the axle transmits the power as well as carrying the load.

Semi-Floating Type

After the axle just described came the "semi-floating" type. The type just described was taken from the outer end back to the inner bearing. Here, instead of the shaft carrying the load, the differential case extended far enough into the housing to place a bearing, as Fig. 2 at E. Between this and the housing was placed the roller bearing C. Instead of the shaft carrying the load as just described it simply passes through the differential transmitting power or rotary motion through its end, whether square or round. Any axle, then, whose main shafts are free at one end from all strains in any plane through their axes are free from one half the possible forces involved in this discussion and is, therefore, at least the "semi-floating."

An axle may be "semi-floating", whether or not the axle can be drawn from the housing without taking the housing down. They are put on the market in both ways, but that matters not, in considering the term "semi-floating."

Three Quarter Floating

Many argue that such a thing as a "three quarter floating" is not made, while some few consider it as the writer does. We will now turn our attention to Fig. 3, and we have what many, both manufacturers as well as users term, a "full floating". In this type we find that the differential end is exactly the same as in the abroad, and consists of relieving the outer end of the shaft of the radial load only. Suppose we have the wheel twisted as shown by the dotted lines Fig. 3 at F. This would have a tendency to bow axle A as shown by the dotted lines. In this case the axle must take the strain; consequently, we do not have a "full floating" axle, and for the want of a better name we must term it a "three quarter floating." Most axles made in this manner are so constructed that shaft A may be removed from the housing without taking the housing apart. Where the shaft enters the differential it is usually made square and locked at H to prevent it coming out of its fastening.

Full Floating

If we take the same construction as shown in Fig. 3 and place an extra bearing BA we have overcome the axle being bowed when the wheel has a severe side thrust as shown in Fig. 4. In this we have the strain taken by the back bearing; consequently, we have in every sense a "full floating" axle. Thrust in both directions must be provided for and usually is made with a "take up," so to speak. Experience has proven that the full floating axle is a trifle noisy as compared to the live axle, because of the many joints and toggles necessary in making the full floating axle.

A Real Boy at Seventy-One

A Village Blacksmith and a Friend to the Kids

Out of the suburbs of Brooklyn there comes a Winter's Tale, appealing to the hearts of all boys who are real boys, a tale of a merry old man who was himself a boy, in the long ago, and who had not forgotten. Down at Sheepshead Bay last night the folks were saying that August Friend really had never recovered from the attack of boyhood he had early in life and that he was still "one of de fellers." All the small boys there went far beyond this, declaring with enthusiasm, and as a matter of fact, that he was the "dandiest pal in de bunch," the before mentioned "fellers" being "de bunch." All this because Mr. Friend, the never lost spirit of his juvenile days asserting itself, saved to the anxious lads of Sheepshead Bay the joy of coasting on Homecrest Hill, when it seemed that this sport was about to be lost to them.

It's one thing for a chap to live up in the Berkshires or the Ramapos or some such place, where he can have his pick of any number of long slopes to coast on, with none to say him nay; but it's an entirely different thing when a fellow's lot is cast in the lowlands of Sheepsheads Bay, and there is only one hill, and that a pathetically little one, and on private grounds. That's just the way it was with the boys of Sheepshead when the snow came this winter and they gleefully got out their gayly painted prides on runners. There was the "Meteor," proudly possessed

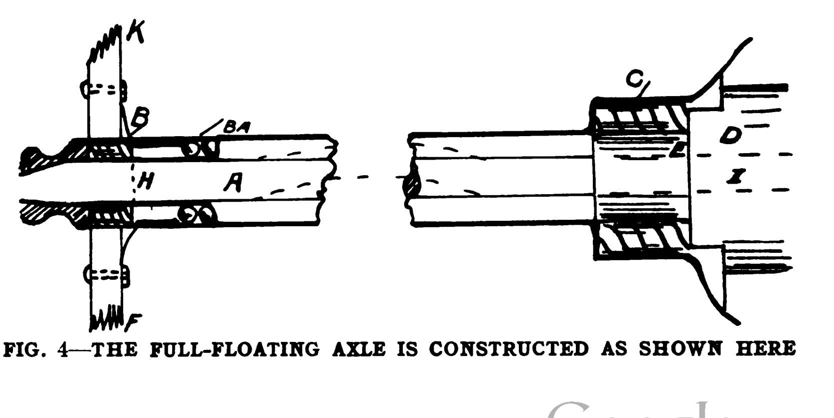
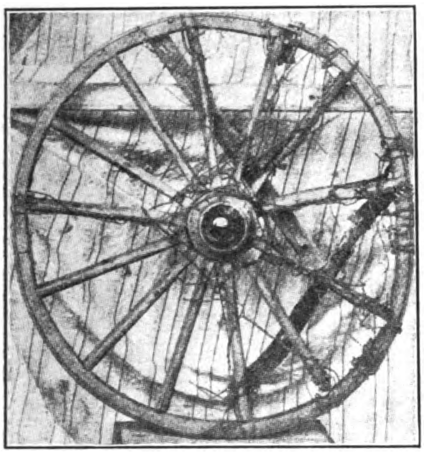


FIG. 4—THE FULL-FLOATING AXLE IS CONSTRUCTED AS SHOWN HERE



FENCE WIRE REPAIRING

The farmer uses fence wire for all kinds of repair work, and when a wheel needs bracing it is not excepted. This wheel was brought into a shop of Victoria, according to an Australian exchange.

by Willie Grant; Jimmie O'Connor's swift "Shooting Star," Eddie Wilbur's "Lightning," and others, and there was promise of some fine sport. Well, everything was all right for a day or so and then the trouble came.

Neighbor Had Complained

It seems that at the foot of the hill, at Neck and Shore Roads, lives William Thompson. He has grown up and isn't a boy any more, like Mr. Friend, who lives near the top of the hill. It isn't known in Sheepshead whether Mr. Thompson was given to coasting when he was a lad, but anyhow he objected to such a thing on the hill by his house. He said his wife was nervous and the shouts of the coasters annoyed her. So he told the boys they would have to go somewhere else to coast. Now, that was easy enough to say, but how could it be done, with not another hill around? Of course, it couldn't be done, so some way had to be thought out to circumvent, which means get around, or fool, Mr. Thompson.

"Reddy" Burke, who has an eagle eye, was picked to "lay bones," that is to watch out for Mr. Thompson the first afternoon. Every time Mr. Thompson appeared "Reddy" would yell "cheese it, fellers," and the "fellers" would stop coasting. But the next day a big policeman, supported by Mr. Thompson, appeared, and there was "nuttin' doin'." as "Reddy" disgustedly expressed it. So it was for several days and only the most daring of "de bunch" would attempt to take a slide.

Mr. Friend looked upon all this—the objections of Neighbor Thompson and the discouraging presence of the policeman—with growing disapproval. The boy in him was beginning to appeal.

"Don't you remember the old days when you had the best bob on the hills, and the fun you had?" it kept asking him. "That isn't a hill such as you had, but it's all these kids have to coast on."

Mr. Friend is seventy-one years young. He is a blacksmith, and many times he stood outside his smithy watching the boys being shooed away from their precious hill. At last the boy in him would stand it no longer. Taking off his leather apron the smith trudged determinedly to the Sheepshead Bay Police Station. He tried to have the police guard withdrawn from the hill. His plea was earnest, but it failed. Mr. Friend was disappointed, but not beaten. Calling the boys around him he addressed them.

"Now, look here, you young scamps," said he, "is there any other place around where you can coast?"

Glumly the young scamps assured him that there was no other place.

"All right, then," said the smith, "just you chaps hold your horses—I mean your sleds—for a time and we'll see what can be done."

Yesterday Mr. Friend went to the office of a real estate agent in Coney Island Avenue.

"I would like to lease that hill at Neck and Shore Roads," he announced. "How much do you want for it for sixty days?"

The puzzled agent told him and the deal was made.

Good News For the Gang

When Mr. Friend got back to the hill the boys were standing around with their idle sleds, wrathfully eyeing the policeman.

"Now, you fellows," said the blacksmith, "I'm the boss of this hill for sixty days. I'm going to sub-lease it in consideration of one good cheer, here given, to all you chaps and you can do your darndest with it. Go ahead."

The boys, wild with delight, paid for the sub-lease over and over again. Their yells brought the policeman up. Mr. Friend smiled. He exhibited his lease.

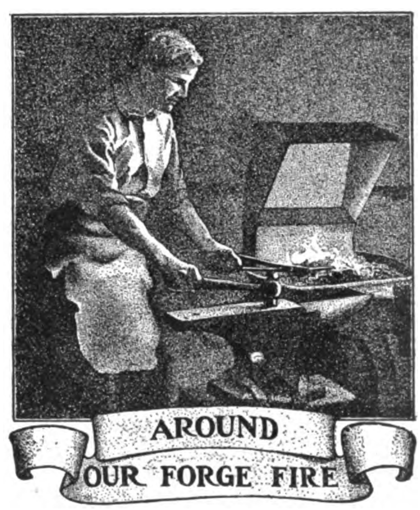
"I am the lessee of this hill now, officer," said he, "and these youngsters are the sub-tenants. They can coast on it to their hearts' content."

The policeman went to the station and reported. He did not come back.

"Just a minute, boys," said the triumphant blacksmith, to his young friends. "To close this deal between you and me you shall give me the first ride down the hill under the lease."

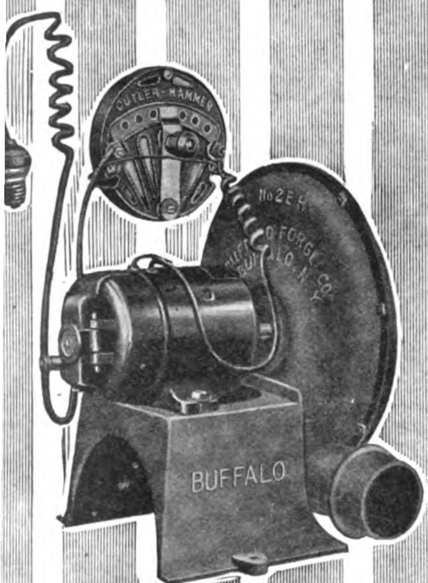
There was almost a fight over the question of who should take the lad of seventy and one years down. He finally got on a bob and steered it to the bottom, with a sprawled out, sliding, yelling crew of delighted small boys following.

"I think I'll take a slide or two down with the kids every evening," said the jolly blacksmith. "I was a boy once. My memory's pretty clear about it. Blamed if I don't think I'm one still. I'm starting to build those kids a big bob, one that'll carry a dozen or so of them. You can bet we fellows will hold on to this hill until the Fourth of July, if the snow lasts that long."



A Song of Cheer

The way is long, the tea is cold; the bard is fat and growing old. But what the dickens if I am? I do not care a Hepsidam. I sit and turn the bard machine and biff Dull Care upon the bean. I do not rhyme or reason why but soak affliction on the eye. O, yodel forth a yip of cheer and hook a left on Sorrow's ear! O, skip and dance and toss your hats and hammer Grief upon the slats! O, mop the swiftly falling tear, and join me in a song of cheer! Bang Melancholy on the snout and knock Old Tribulation out!



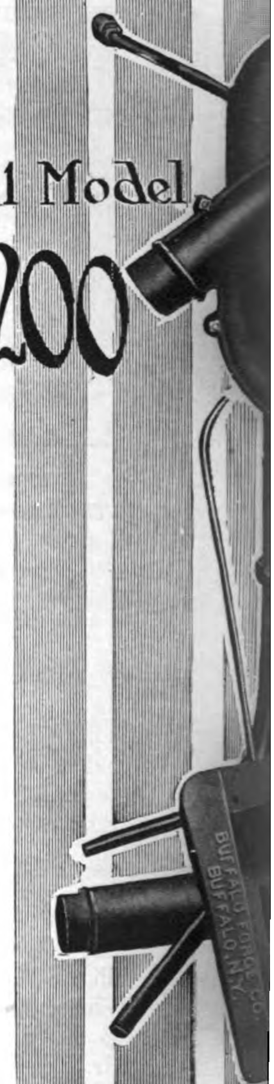
Variable Speed Electric Blower

No cost of installation. We furnish it complete with wire and plug. Simply attach to lamp socket. Uses less current than a 16 C. P. electric bulb. Dust-proof casing with hinged doors. Triple size brushes. Automatic oiling. Oil cups cannot be broken. Large fan. giving high pressure at low speed, saves power and lengthens life. Ask for Catalog No. 154-A.

Everything in

Buffalo 200

1911 Model



151-lb. Rails heated by 14-inch hand blower in railroad shops

The United Railways and Electric Co. of Baltimore, Md., informs us that they have used the 14-inch blower for heating 151-lb. rails for frog spacing, after they come from the foundry; also that all their welding in the shops is done with this 14-inch No. 200 blower. ¶ The American Pipe and Construction Co., Amsterdam, N. Y., advises us that they handle material up to 7″ wide with this blower without any trouble. ¶ These are only two cases out of a thousand, in which the 14-inch "Buffalo 200" is used for work impossible to handle so easily with any other hand blower in existence.

Buffalo Forge Company

Buffalo, N. Y.

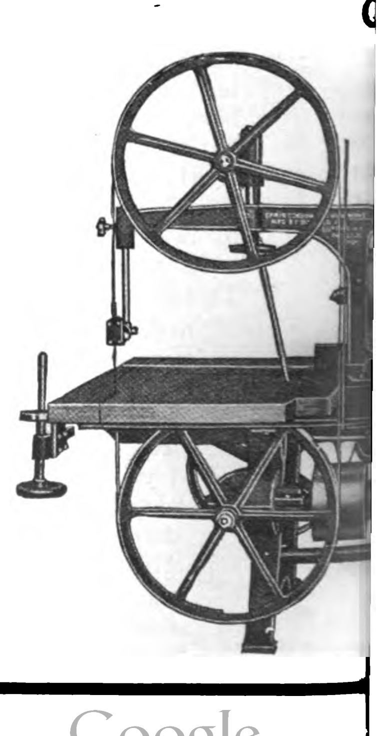
Punches and Shears

e above machine will punch five different holes and cut flat, square and ınd bars without a single change of ıls. Complete Catalog of all styles and es. No. 178-A on request.

No. 650
Hearth, 27″ x 40″

Buffalo Forges

Made in all sizes, with hand, power or electric blower. All standard hand forges are now furnished with 14-INCH "200 Silent Blower and Vulcan" heavy duty tuyere. Takes the heaviest iron, up to 12″ long, in ONE heat. Ask for description No. 126-A.



Ezra Foster

W. O. B..

Where'll y' find Mister Ezra Foster? Wal, stranger, ef its' Uncle Ezra y' mean, jes'—

Go roun' ol' Thompkin's gris' mill
An' across the ol' mill race,
Then a short walk up the mountain
Will bring y' face t' face
With a man—in my o-pin-yun—
Thet hes found life's comfort true,
An' no matter what y've come fer
He'll be glad t' say "How-do".

What's come o' the ol' farm down near Foster's creek? Y' see, stranger—

He's moved from off the ol' farm
Not 'cause he couldn't stay,
Sed the place wus kind o' lonesome
Since the young-uns went away.
Jim, the ol'est's, in the city—
Two rest up on Watson's Hill,
An' the others—Tom an' Betty—
Wal, thar's none found Thompkin's mill.

How long's he lived on the mountain? Wal, I'll tell y'—

He hes lived behind the mountain
An' its shadder many day
Age is creepin' down upon him
An 'ill soon take him away.
Yes, he knows a darker shadder,
Then the mountain's shade, is nigh
An' he knows it's growin' deeper
An' he'll soon be called on high.

Is Missus Foster still livin'? Wal, now y' better be a goin' over thar right now for—

Ef y' find him in the twilight
O' a mellow summer day,
Like es not y'll find b'side him
With 'er hand up this-a way
His com-pan-yun on the jur-ney
Thet is now most t' its end
Listenin' t' ol' Ezra's fiddle
Es the sweet ol' tones ascend.

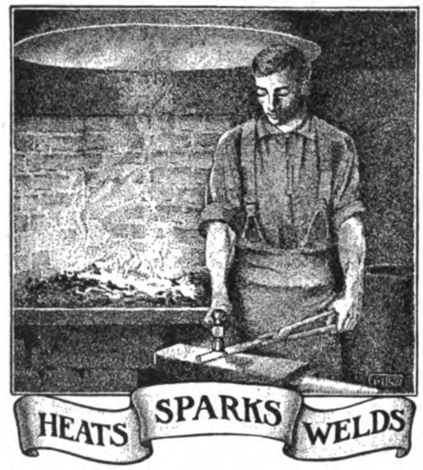
Does he play the fiddle! Wal, now yew jes' oughter hear Uncle Ezra tromp thet thur bow o' his'n.

He's not called a great composer
Nor mu-si-shan with the bow
But he scrapes out "Bonnie Bessie"
Better'n any one I know.
His fid'lin' o' "Kentucky Home"
An "Turkey in the Straw"
Hes got these champeen fid'lers
All beaten t' a draw.

'Most too ol' t' play? Why, stranger, water'll run uphill 'fore Uncle Ezra's too ol' t' fiddle.

Why he seems t' love thet fiddle,
Calls it "Jimmie boy o' mine",
Jes' es tho' it was a human
'Stead o' jes' a piece o' pine.
Then he'll tell y' thet the instermint
Was the fiddle o' his Jim
An' it kind o' keeps them cheerful,
When the lights air gettin' dim.

Wal, now, stranger, I didn't cal-c'late yer heart wus so tender. Er, perhaps the smoke from this ol' pipe's got in yer eye. Yes, y' go down this road—the mill's et the first turn.———. Drat me, ef thet feller didn't look like Ezra's boy, Jim.



A man need not necessarily be an artist to draw a good salary.

Eight quarts make a peck, but a quart of liquor often makes a bushel of trouble.

It's mighty good to advertise, but see that what you advertise is mighty good.

You cannot do business on the money outstanding. There is a moral to this.

A long way toward comfort is a snug, tight shop these days.

Remember, a guess is as good as a miss, and a guess in business is a guess at profit.

Of course, it doesn't insure a good finish, but it's a heap of help to start good.

A bigger job is never handed to the man who is smaller than his present job.

The smith who rises early in the morning is the most likely to rise above his troubles.

Mix a good, liberal quantity of it with every job you turn out. Again we say, satisfaction is a big trade-winner.

When you conclude that competitors are quite mean, don't forget that you are your competitor's competitor.

Hustle some business along toward your shop while waiting for something to turn up.

Perhaps your debtor doesn't pay his bill because his horse has no shoes and he therefore cannot drive to the shop.

Vacuum machines are being used for taking dirt and dust out of carpets. Wonder if they could be used for getting money out of debtors.

It's no longer necessary to work like a slave in the smith shop. Much of the drudgery is taken out of smith work by modern machines. Proper tools are what you need.

The man who devotes all of his time attending to his own business will find himself mighty busy and some days mighty successful. How true of blacksmiths!

Never judge a man by his occupation. Remember, a smith uses a hammer continually, yet he may be the biggest booster in town.

When you take a chance, the chances may be against you, but the chances are never so great against anyone as against the man who never takes a chance.

What does your shop indicator say? Your scrap pile will tell you whether your profits are going into your pockets or out of the door and into the junk man's wagon.

Sometimes it's economy to scrap a machine. It doesn't always pay to repair broken equipment. The wise smith knows when to do what.

What salary do you pay yourself as owner of the business? You should receive more than your best man, because you are worth more.

There is just one smith whom THE AMERICAN BLACKSMITH cannot help—the smith from the Land of Tomorrow—the smith who puts off subscribing.

Don't think the other fellow's stand is better than your own, until you have made a great big effort to do business at your own stand. It's not the location that gets the business, it's the man.

You can't get business unless you are full of business every business minute. Be bursting and bubbling over with business every business day and you'll not be able to keep success from your door.

If you haven't applied that coat of whitewash to the shop interior, better do so now. Benton says to put some Portland cement into the mixture,—hangs to the wall better.

What an Eden this world would be if the tongues of men would take an example from the tongues of wagons—persistency in attending strictly to the business of guiding their paths through life correctly.

Are you binding your back copies? Ask about the very good binder we can furnish you at low cost,—name of "Our Journal" in gold on front cover. Write the book man about it.

You cannot cut expenses by cutting prices. You cut profits when you lower the selling figure. Better by far to cut costs, keep the selling price where it is and thus increase your profit.

Is your name on "Our Honor Roll"? Better sharpen your pencil and figure out how you can get on that list. It's going to be more difficult each month to place your name there so you had best hurry up.

The aim and mission of "Our Journal" is to give you practical, money-bringing, profit-increasing information about your trade. Not the social news, nor the political news, nor mere theoretical ideas. You are more interested in that new kink of Benton's or that shop-made device of Thornton's than you are in the fact that Bill Evans has just been married or that Arch. Mills has just been presented with a new son.

A year with 13 months of 28 days each—What do you think of the idea? That is what Almanac Reform League is suggesting. Christmas Day to be the extra day of the year, and the additional day of leap year to come as the first day of the new month. The new month is to be named "Sol" and is to come between June and July. If this suggestion is adopted all dates of the month will occur on the same day. For example: The first, eighth, fifteenth and twenty-second in each month will occur on Sunday.

When asked if he had any books on auto repair work, Tom said: "Hardly worth while t' study fer a trade y' never expect t' work at. I don't git a chance at the trade. The goggled gents all seem to go down the street t' Brown's." Friend Tardy is surely a hopeless case. We tried to explain how easily he could get auto-work if he would simply get one or two auto-books—how a neat sign would call the autoist into his shop—how a neat shop would help. But Tom would have none of it and all but put us out in his hurry to close up for the day, though it was but three o'clock.

Sailing on a railroad seems strange, yet that is exactly what they are doing on a railroad in Chile. The railroad is in a vicinity where the tradewinds blow with clock-like regularity. The constructing engineer finding difficulty in transporting men and materials over the line decided to take advantage of the winds, and sailing up and down the line has become a regular feature of the work of the construction crew. Good sized box cars were built for the purpose and each car is equipped with a sail. There is no other propelling power, and the average speed attained is about 35 miles an hour.

Our Honor Roll

Mr. Stites Regains First Place

Mr. I. J. Stites of New Jersey again heads Our Honor Roll, and Mr. Turner must take the second position. Mr. Stites in taking advantage of the special long-time, five-year rate says: "New Jersey cannot stand in the background."

Who will be the next leader? It is getting more difficult each month to gain a place on this list, and the sooner you do some figuring the easier it will be for you. Remember, as names are added to the body of the list, others must be taken from the end, as we must limit Our Honor Roll to this page.

	U. S. and Mexico	Canada	Other Countries.
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s

A paper with a list like this and with several thousands of other subscribers who have paid in advance to 1914, 1913 and 1912 must be valuable. Practical smiths don't pay for a paper in advance unless that paper is practical and worth real money. Ask your neighbor to subscribe—show him this list.

NAME	Subscription Paid to
I. J. Stites, New Jersey	Jan., 1928
W. R. Turner, Manitoba	Oct., 1923
W. Lawson, New Zealand	Nov., 1922
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O. M. Johnson, Minnesota	Oct., 1921
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W. K. Kline, Kansas	May, 1921
R. S. Crisler, Kentucky	Jan., 1920
I. M. Townsend, California	Apr., 1919
T. P. Considine, Massachusetts	Dec., 1918
Richard Brenner, Texas	Feb., 1918
W. F. Hill, North Carolina	Feb., 1918
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, North Dakota	Nov., 1917
H. Ferrel, Illinois	Aug., 1917
W. McCoy, Kansas	May, 1917
E. Thibaudeau, Wisconsin	April, 1917
J. N. Miles, Kentucky	April, 1917
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S. Stemple, Ohio	Mar., 1917
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M. E. Goller, Pennsylvania	Feb., 1917
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W. W. Egly, Pennsylvania	Dec., 1916
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J. Williams, New South Wales	Dec., 1916

NAME	Subscription Paid to
J. H. W. Schneider, California	Dec., 1916
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Jno. Goetzinger, Iowa	Sept., 1916
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Geo. Hill, Australia	Sept., 1916
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Oscar Buhner, Maryland	Sept., 1916
A. J. Hammond, California	Sept., 1916
Robert Murray, California	Sept., 1916
D. E. Wright, Pennsylvania	Sept., 1916
J. S. Haskell, Colorado	Sept., 1916
R. Sommer, Australia	Sept., 1916
J. A. Sequin, Canada	Aug., 1916
James Clarke, Jr., Australia	Aug., 1916
Dispatch Found'y Ltd., N. Z.	Aug., 1916
C. P. Robertson, South Africa	Aug., 1916
A. C. Lodwig, California	July, 1916
A. A. Bahlke, Michigan	July, 1916
J. K. Hansen, Australia	July, 1916
J. B. Barker, Illinois	July, 1916
H. M. Larsen, Wisconsin	July, 1916
Geo. P. MacIntyre, Maine	July, 1916
Jas. A. Buchner, Michigan	July, 1916
G. R. Harrison, Australia	June, 1916
J. Waycich, South Africa	June, 1916
W. Voight, South Africa	June, 1916
Martin Jensen, Wisconsin	June, 1916
Chester Humbert, Wisconsin	June, 1916
Lincoln Underhill, California	June, 1916
M. Broton, North Dakota	June, 1916
Hans Eriksen, Illinois	June, 1916
C. Morrell, New Brunswick	June, 1916
J. O. Conrad, Kansas	June, 1916
Adam Schmitt, Michigan	June, 1916
James Sinclair, West Australia	May, 1916
H. Baker, Australia	May, 1916
E. Q. Krehbiel, Kansas	May, 1916
C. H. Cairns, New York	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vermont	May, 1916
C. A. Stebbins, Kansas	May, 1916
Sanford Baker, Missouri	May, 1916
P. A. Peterson, Iowa	April, 1916
D. E. McDonald, Florida	April, 1916
James Baxter, South Africa	April, 1916
E. P. Dignan, South Australia	April, 1916
W. H. Winget, Vermont	April, 1916
C. Schmid, Nebraska	Mar., 1916
A. Rockenschup & Son, La.	Mar., 1916
C. H. Alexander, New York	Mar., 1916
A. M. Harebo, Wisconsin	Mar., 1916
George Howard, Kansas	Mar., 1916
G. N. Follmar, Nebraska	Mar., 1916

NAME	Subscription Paid to
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Frank L. Evarts, Connecticut	Mar., 1916
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Jas. A. Sharp, Massachusetts	Dec., 1915
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P. E. Dahlfurst, California	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
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G. S. Fisher, Nebraska	Dec., 1915
Printers Supply Company, Nebraska	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
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P. W. Frazer, New Zealand	Dec., 1915
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D. Codere, Illinois	Nov., 1915
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A. M. Byfield, West Australia	Aug., 1915
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J. W. Storment, Illinois	Aug., 1915
Jos. P. Rotolinski, Massachusetts	Aug., 1915
G. N. Ferree, Utah	July, 1915
T. O. Chittenden, New Zealand	July, 1915
The Goldfields Diamond Drilling Company, Australia	July, 1915
J. A. Lawton & Sons, South Australia	July, 1915

Ten Questions For the Month

It seems appropriate this month to consider some questions on business and business principles. It is not enough for a smith to be a good mechanic, he must also be a good business man. And to be a good business man he must know and understand the principles of good business. The ten questions this month are framed with the idea of causing the smith to realize how much or how little he does or does not know on business subjects.

1.—What is profit?

2.—To what is it proper to charge the cigars you hand to good customers?

3.—If you own your shop building how do you charge taxes on the building?

4.—How are freight and express charges cared for?

5.—What is interest on investment?

6.—Should rent be charged to the business if the smith owns the building?

7.—What rent should be charged?

8.—How are uncollected accounts cared for?

9.—Does an inventory of your stock and equipment represent a true statement of your investment?

10.—What is the object of bookkeeping?

These questions will seem elemental to some readers, but there is not one that the smith shop owner should not be entirely familiar with. A little more attention to our business books, our record, swill also help elevate the standard of the craft. Let us one and all think on these things.

Answers To Questions in February Issue

1.—Temper as used by the steel maker means the quantity of carbon which the steel contains.

2.—Temper as used by the steel workers means the degree of hardness of a tool or piece of steel.

3.—Hardening is simply the process by which steel is hardened without any regard to the degree of hardness. Tempering is the process of giving a piece of steel the correct degree of hardness to do its work properly.

4.—Annealing is the process of treating steel to make it very soft for machining and other manipulations. While tempering may be a softening of the steel, it lowers the degree of hardness simply until a certain and proper degree is reached.

5.—Steel is annealed so that it may be machined and manipulated in other ways more easily.

6.—A "water crack", according to some tool makers, is any kind of a crack that shows up on their work—never (?), of course, the result of their carelessness or ignorance. Actually, water cracks are the fine cracks formed at the ends of hot billets where the cooling water drips.

7.—Case hardening is the process by which steel is given a hard wearing surface. It is done by heating the steel and causing it to absorb carbon.

8.—Long articles should be dipped in the bath as nearly vertical as possible so as to have all sides cool and contract uniformly.

9.—By trying it with a sharp file.

10.—Allow it to cool off and then reheat to the proper degree.

The Divining Rod Expert

C. J. Winston
Manager Goldfields Diamond Drilling Co.

We are sending you a clipping from "The Queensland Government Mining Journal." You will notice that the divining rod expert does not come out with flying colors when he is asked to choose a place where there is no water.

Take Victoria, Australia, for instance, a man is pretty safe in finding water with the rod practically all over, as long as he keeps off the granite ridges. The real test is the one explained in this clipping, at which they have failed miserably—it is only another argument in support of our contention that it is "more by good luck than good guidance" when success crowns their efforts.

Water Diviners in South Africa

The Springs Mines, Ltd., in far Eastern Rand, has been shaft-sinking for over a year, but owing to the bad ground and water encountered, the depth is only about 700 ft. Better strata have, however, now been reached, and improved progress is confidently anticipated. As an instance of the dread in which the dolomite—a kind of caverned and jointed magnesian limestone—is held, the appointment of a water diviner by the Daggafontein Gold Mining Company, Ltd., to point out a position for the shafts where water would be avoided ought to be mentioned. Hitherto water diviners have been employed to show where an abundance of water exists, and it seems rather a novel idea for a water diviner to be called upon to show where there is no water underground. In this case, the water diviner completely failed to indicate a suitable spot, and the shaft is flooded with water just as though his services had never been called in. There is a feeling that unless circular shafts are sunk and these heavy flows of water shut out, the Far East Rand Goldfield will afford several instances of shaft-sinking failures where any thickness of dolomite has to be pierced. At Modderfontein a circular shaft is being sunk, but although it is in the same field dolomite can scarcely be expected to be present. The circular shape has apparently been selected to promote ventilation, and because the consulting engineer, a coal mining engineer from South Wales, has been accustomed to circular shafts. The selection of this shape is giving rise to considerable discussion.

How to Repaint Old Gears and Chassis

Also a Good Way to Paint New Gears Quickly

W. A. Riggleman

All wheels and wood parts to gears and chassis are supposed to be primed when they come into the paint shop. New wheel axle caps should be sandpapered well before priming, and if wood spring bars are used they also should be sandpapered and primed. All springs should be taken apart or loosened so that they can be sandpapered well and leaded between the flat parts or, in fact, all over. Use a lead with little oil in it for springs, as springs when they come from the factory have a coating on them that is dangerous to paint over, and this method stops the rust from coming out on the edges and causing the paint to scale off after the blacksmith has ironed the gears.

A quick way to do gears is to putty right on this priming, and you can sandpaper all you please. After sandpapering, dust well and give the gear a coat of dark lead with a little oil in it. Put this coat on with a camel's hair brush so you can get on a good heavy coat. Now moss or hair this coat. Next give the gear a coat of color the same as you wish it finally to be, a coat of color varnish, stripe and finish. This is the old quick way and a good one. What is the use of giving this new gear a coat of lead on top of the priming and then puttying and sandpapering it all off and then giving it another coat of lead? The way I have just explained saves one sanding and one

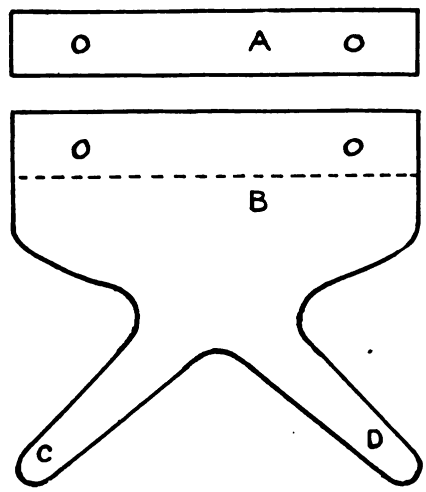
coat of lead. Thus time and stock is saved and your job is just as good.

Here is something to remember: Always have the blacksmith do all his drilling with linseed oil on anything that has to be painted. Then you will have no trouble with grease on your wheels and gears. Old gears at the present time are not in very bad condition unless you strike some old time job that has been painted several times. You will have to sandpaper an old gear down good with a No. 2 sandpaper which puts it in pretty good shape. After you have finished sandpapering, give the gear a coat of dark lead mixed with keg white lead, dry lamp black, a small amount of japan and oil well mixed and thinned with turpentine. Put on with a camel's hair brush. When dry, putty very little and sandpaper those spots. Moss the rest of the gear. As you sandpaper a wheel or the gear part or shafts, dust and touch up the putty spots with the color the gear is to be. When you have sandpapered, give the gear or chassis a coat of color on the putty spots so that they will not show and, finally, color varnish, stripe and finish. This is a quick way to do this work. Use a good gear and body finishing varnish.

A Set of Vise Jaws

J. A. Caless

I noticed in a recent issue a method of making vise clamps. I enclose details of a pair made by myself, and in constant use, which can be made by any blacksmith in very little time and at very small expense. The user does not have to be continually picking them up off the floor, as the clips C and D hold them in place until they are lifted off. A piece, B, of sheet steel 1⁄6 inch thick or 1⁄8 inch can be used. Assuming they were made for a 4-inch vise, two pieces of stock 4 inches by 4½ inches would be taken. It is then cut out to the shape shown, to prevent buckling and to allow C and D to be bent easily to the shape of the vise. At A is an old switch bar of copper, 1⁄8 inch thick, 1 inch wide. Two pieces 4 inches long are cut off and clamped in position at dotted line. They are then drilled for a thick copper rivet. The two pieces, A, are countersunk on the front side, and the two pieces, B, countersunk on the back side or that which will be next to the vise jaws. They are then riveted with the copper rivets and placed in position in the vise; the edge of the copper being level with the top of the vise jaws. They are then tightened up and the sheet steel is hammered down over the vise. The two ears, C and D, being



HOW THE VISE JAWS ARE MADE

turned down prevents them from falling, but they are easily lifted off. If desired a pattern may be made and they may be cast very cheaply.

How To Install a Village Water System

Dayton O. Shaw

In this part of the country, small hamlets and villages are installing water systems. The place may be too small to support a machinist; it is expensive to send to the city for a plumber, and the only man on the ground that can do the job is the village blacksmith. He will have the tools and forgings to make,—why not do it all? I will endeavor to give a few points that perhaps would be helpful to the smith, should he choose to take up this work.

The most unique water system that I ever examined was in St. Michael, Azores Islands. The water came from the hills in a stone aqueduct, built on grade. It was six feet wide and the waterway was about eighteen inches square. In some places where it crossed valleys it was forty feet from the ground. The top of this aqueduct made a splendid place to walk, and at some distances apart there were stone covers which the traveler could take off and get a refreshing drink. The water emptied into stone cisterns in different parts of the city where the beautiful Portuguese women were wont to gather and fill their pitchers, something, it seems to me, the poets have left unsung. But what appealed most to me was the solidity of the mason work and the purity of the water. It was not contaminated by cesspools or lead pipe. In a settled community where water is taken from wells or conducted through lead pipe it is harmful and dangerous, and this is one of the reasons why people are calling for water that is pure to drink, more convenient in the home and a protection against fire.

The system that I shall try to illustrate is for a village precinct where an 8-inch pipe is sufficient for the supply. Let us commence at the reservoir. You will notice in the engraving that there are two pipes which run through the dam. The one that takes water from the bottom is the draw pipe and is used for draining the reservoir when necessary, and runs into a waste-way. The intake on the main pipe is raised 3 feet above the bottom. Near the center of the dam is a well house from which to reach the gates that control the supply. There should be a drainpipe run from the well into the waste-way. The pipes through the dam should not have a pitch over ¼ inch to the foot, and for good work it should not pitch over ¾ inch to the foot anywhere on the line, either up or down or in making a curve. Our pipes are 8-inch cast iron. They are placed bell-end upstream, with room enough on sides and underneath to swing a hammer.

Now we will select from our outfit a couple of yarning tools. They are made from ¾-inch octagon steel; the blades are 4 inches long; the end of one blade is 1⁄8 inch thick; the other about 1⁄16 inch thick. They

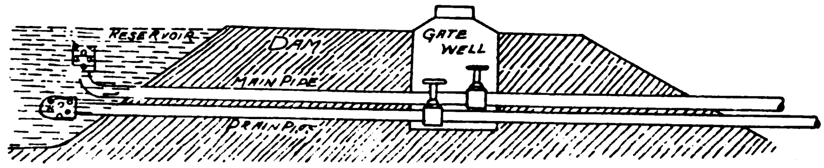


FIG 1—A SECTIONAL VIEW OF THE RESERVOIR DAM, SHOWING PIPES, GATES AND STRAINERS

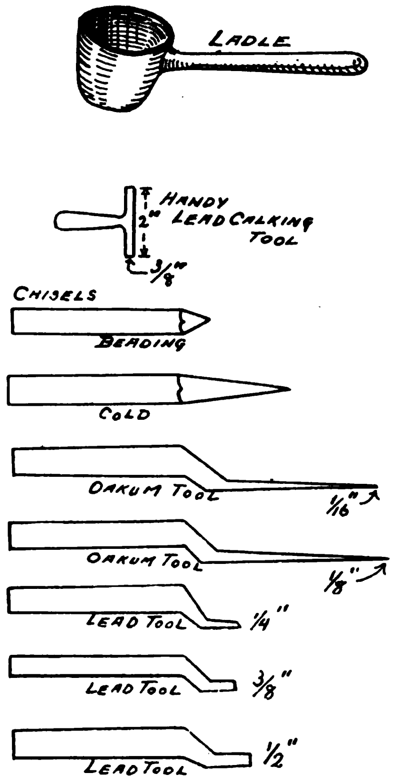


FIG. 2—SOME OF THE TOOLS USED BY THE PIPE-MEN

are tapered a little with a 1-inch offset and spring tempered. The joint to be leaded is wiped clean and dry. The oakum is tamped in as hard as one can without the use of a hammer, leaving 1½ inch for the lead. The runner is now placed around the pipe and clamped. This operation also forms a gate on top of the pipe in which to pour the lead. In cities, fireclay is moulded around the runner to keep the lead from breaking out, but, in the country, loam mixed with salt and water and made into mud balls is a good substitute and less expensive. A light, portable forge that can be carried around easily is a part of the outfit. Enough lead should be melted to fill the joint at one pouring. The lead should be hot enough to blaze a pine stick before being taken from the forge. After the joint is poured and the runner taken off, take the thin cold chisel and chip off the surplus lead where the gate was formed on top of the pipe. Now take the beading chisel and start the lead back close to the pipe around the joint. Next take ¼-inch calking tool and drive around first, then the ⅜-inch, then the ½-inch and then trim off the sides. The lead should be driven in ¼ inch. Sometimes one has a narrow place in which to swing his hammer. I have a special tool two inches long for such a place. See engraving.

In driving the lead there will sometimes be a place that will cave in or drive in farther than the rest. If this should be near the top, a mud gate can be formed, but, if on the bottom, a runway is chipped down the side, the runner put on and the lead poured again. One of three things may cause this,—the oakum may be tucked in enough to hold the lead, but not enough to hold the driving; or the lead may be too cold to fill the joint properly or, again, there may be moisture in the oakum or pipe that generates steam and makes blowholes. Have your oakum dry, tamp solidly and have your lead hot and you will have no such trouble.

On entering the precinct, before any hydrant or service pipe is connected to the main pipe, the latter should be flushed out and a gate should be put in, always flushing the pipes before putting in a gate. Be as careful as you can, for dirt and sand will get into the pipes in spite of all caution, and if allowed to remain there will probably make you trouble. The next connection to make will be a hydrant. It should set no farther than 150 feet from the first house. The bell-end will have to be cut off of the branch pipe that leads to the hydrant. Take a cold chisel and cut around the pipe until it breaks. A diamond point is used when cutting the pipe in the ditch. To set a hydrant a flat rock is placed on the bottom of the ditch for it to rest on. The hydrant is let down and the pipe entered. Now, lean the top of the hydrant forward, put a block of wood behind and draw back. This action throws the hydrant chuck up into place; now wedge rocks behind and on sides before calking.

There should be a gate at every dead end. Some have made the mistake of forming a loop. In such cases when water is drawn from one side it starts from two ways. When shut off and drawn from the other side the action is similar. As the water is churned back and forth it mixes with air and when drawn is white and frothy. This is more annoying than harmful, as it becomes

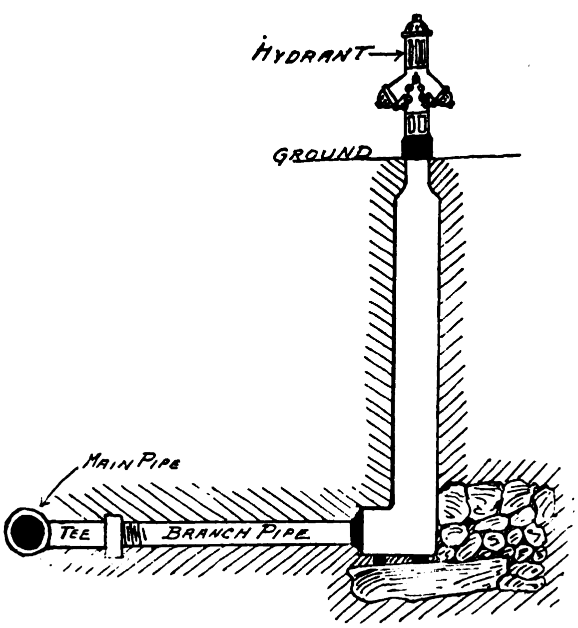


FIG. 3—HOW THE HYDRANTS ARE SET UP AND CONNECTED

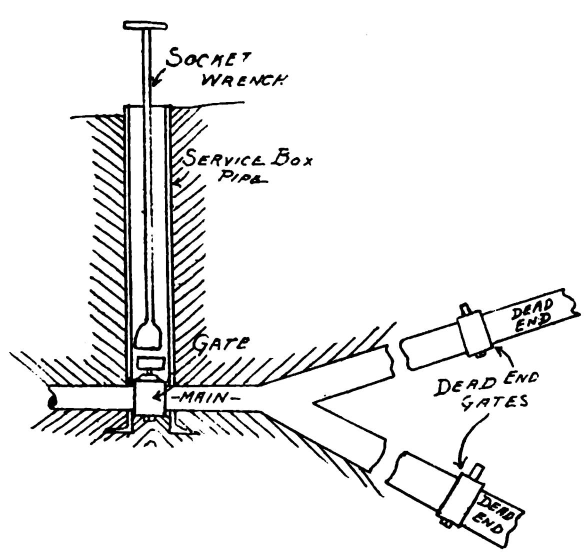


FIG. 4—THE GATES AND CONNECTIONS AT DEAD ENDS

clear in a short time. No service pipe should be connected to the branch pipe that leads to the hydrant or within a number of feet of a dead end gate. There is a vegetable matter which gathers in these places, and if not drawn off occasionally it will have a bad smell. For common dwelling houses 1-inch pipe is large enough. For a large building or block where 2½-inch pipe is called for I would use a T reduced to 4 inches, and calk in a 2½-inch wrought iron coupling. While it is nice and handy to have corporation cocks they are more expensive than the street elbow.

For dry drilling, a machinist's ratchet drill with cap and chain works well. Your drill bit should have a good taper and should not be tapped to quite a full thread. The corporation cock is connected on the side, and the street elbow on the top of the pipe. The street shut-off may be placed at the edge of the side walk or near the owner's land. The shut-off is covered with a service box and is worked by a long wrench made to fit the T head. In piping houses where there is danger of freezing, the stop and waste should be below the bottom of the cellar and the sides and top boxed up and covered. The shut-off rod should be bolted to the T head and run to the kitchen with the water pipe where it can be operated without going to the cellar. Whenever this can be done it is very convenient.

In testing a hydrant it should be opened and closed very slowly. When a gate has been shut and the water drawn off, the gate at the dead end should be left open after the water has been let on again until the air has been forced out. In repairing the main pipe, if one or more lengths are to be taken out, the pipe is cut and driftwood is piled over the joint. When the lead is melted out, a sleeve is used to connect the pipe again.

In making shut-off rods, take 1 by ¼-inch iron, 6 inches long, double over, weld and draw shank to ⅜ inch in diameter; open the end to fit T head of stop and waste, and drill $\frac{3}{16}$-inch hole in head. For the other end, take ⅜-inch round iron, square the end and make a T handle to fit the square; then cut thread and put on nut. When the right length is found, the ⅜-inch rod is welded in. The rod may have to be bent in putting it into place, but it can be straightened afterwards. The handle is then put on and bolted. The head on the hydrant screw, also, on some gates is 5 inches square.

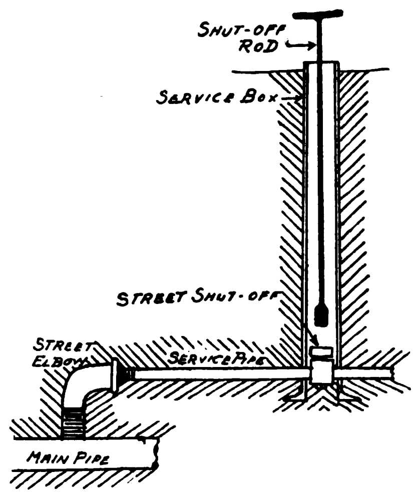


FIG. 5—THE STREET SHUT-OFF AT HOUSE CONNECTION

There are several ways of making a socket wrench. Some use gaspipe, but they are not serviceable; but for any and all kinds we must have a 5-inch square punch. Make it ⅛ inch larger than screw head. One way is to forge a solid head with a shank 4 inches long, ¾ inch in diameter, and then chuck a hole in the lathe and square with the punch. The casing should be ¼ inch thick. Another way is to weld a ring the right size, use stock 2½ by ¼ inch, make a large bolt head on ¾-inch soft steel; fit the head into the ring, weld and form over punch. There is still a third way which I think would make a more proportionate and better job. Take 2½-inch shaft, draw the shank 4 by ¾ inch, cut off enough of the shaft to flatten out 4 inches in diameter and $\frac{5}{16}$ inch thick; then place the work over a hole large enough to take punch and forging; place the punch in center and drive all through the hole, then form over punch, trim square and caseharden the end.

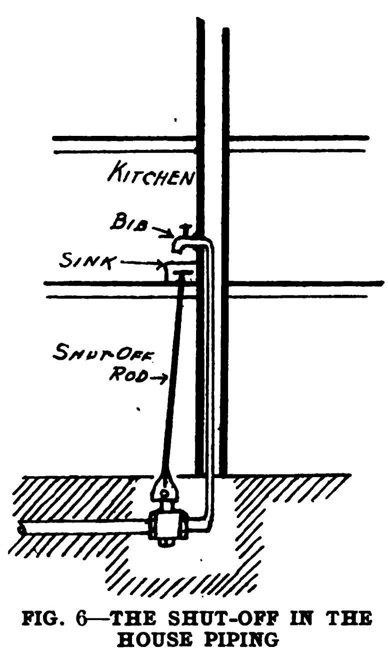


FIG. 6—THE SHUT-OFF IN THE HOUSE PIPING

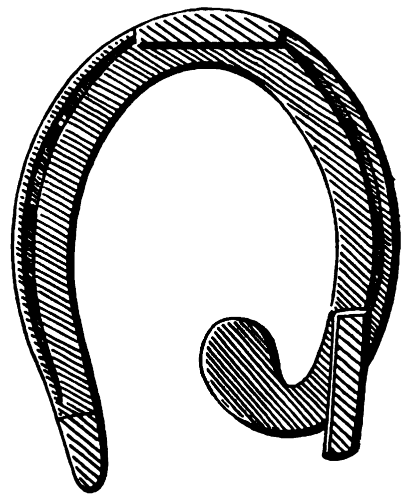
Some Cold Setting Experiences

A. H. Gooding
Australia

I wish to say a few words in favor of cold tire setting, for the benefit of enquirers, and I notice a few skeptics among them, including Mr. W. K. Huff. In the October issue he wants to know how a tire can be made smaller while it is on the wheel. To start with, I might say that I was the first in this State to purchase one of Henderson's tire setters about eleven years ago, and it has been the best money-making machine I have invested in. I have tired upwards of 5,000 wheels to date, and am still tiring that way and no other. I have tired or set (whichever term you like best), from the wheels of invalid chairs up to light wagon wheels 2½ inches by ¾ inches in the self-same machine. I have taken up two and three inches of tires more than the circumference of the wheels, and compressed them as tight as I required them, so that a pair of wheels will ring in tone with each other when tapped with a hammer, and no dishing, crooked spokes or burnt rims; both wheels tired exactly alike.

I will give you a "kink," as you call it. I oil the rims between the tire and the rim, beforehand, which I think is far more preferable than charring them by the hot method. In fact, I have had scores of wheels to box-wedge and straighten up, owing to too tight tiring the hot way. I have in my mind's eye a set of four van wheels I straightened up about nine years ago, and they are still straight and tight and have never been interfered with by anyone else. I could quote many others, six, seven, eight and nine years ago, and still good. Of course, my machine is now out of date, but it is still good, and does me until I can afford a hydraulic one.

My setter is round with several rings of blocks to suit various sizes of wheels. Directly behind each block, (there are sixteen altogether) there is a screw with a square head for a wrench to fit on. Now adjust by hand all these blocks against the tire, a small space between each block about enough to allow the blocks to close in a bit without jamming when the wrench is applied to the screws. Wrought iron is compressible, cold; cast iron is not compressible, cold. So the tire being wrought iron, and the pressure being gradually put on by going around the machine with a sufficiently long-handled wrench, what must be the result? The circle, composed of blocks forced against the tire and getting smaller, must of necessity compress or upset the tire. It cannot get out or away from the pressure, which is greater than the tire can resist or withstand, and therefore the tire is thickened and shortened until you see that the tire is sufficiently compressed and grips the wheel sufficiently tight. Then you have a wheel which is inside the tire, so the tire must be the larger, as it compressed the wheel so that it is solid and holds it firm. Of course, if one is inexperienced or careless, he might overdo it and make the wheel too tight, bend the spokes, dish the wheel or spoil the job. Now, perhaps, Mr. Huff can see the force of the logic of Brother Smith of Kentucky when he says the tires are always larger than the wheels they are on. I might also add that when the wheels are loose and require retiring that they must have shrunk even still smaller than the tire, as the tire has not expanded. Surely this clinches the argument. I perceive there are different makes and styles of cold tiring machines; some round and some sectional, and I have no doubt they will all do good and effective work in skillful hands. A good many people will get their wheels done—good, bad and indifferent—and if the bad and indifferent ones do not last well they jump to conclusions immediately and say the machine is no good. I remember on one occasion a farmer had two wheels tired cold by me and two wheels tired hot by another blacksmith, to see which lasted the longer. The following summer they all got loose again at the same time, so he concluded one was as good as the other, at any rate, only as the cold process was the cheaper I did the lot the next time. There is no doubt wheels can be tired well cold or hot, but the cold is the safer and better and quicker way.



A GOOD SHOE TO USE ON A FOOT AFFECTED WITH CORNS

Curing Corns Successfully and Scientifically

J. N. Nevills

Corns are divided into three classes: dry corns, suppurating corns and chronic corns. To explain all would mean quite a lengthy discussion, but we will take up the latter, chronic corns. In this case there is a vivid discoloration of horn in all possible hues. The horn is either soft, moist and lardy, or crumbling, cracked and at times bloody. The inner surface of the horn has lost its normal character and is covered with horny swellings or nodules. Sometimes the wing of the os-pedis (pedal bone) on that side has become enlarged and loosened; a short, cautious gait alternates with well-marked lameness; the latter appearing whenever the shoe presses too firmly on the corn or when the hoof becomes too dry.

IT'S THE SMITH'S BUSINESS TO SEE THAT THE FARMER'S IMPLEMENTS ARE IN PROPER WORKING ORDER

The proper treatment is to first remove the causes, by restoring the proper form of the hoof through shortening a toe which is too long. (This is especially liable to be the case in acute angled hoofs.) Cut down the quarters which are too high and carefully remove all dead horn from the branches of the sole. Deeply digging out a small area of blood stained horn is injurious. It is much better to thin the entire branch of the sole, uniformly. In doing this we should avoid wounding the velvety tissue of the sole or drawing blood. The proper shoe is the half bar shoe; see the engraving. The pressure should not be taken from the quarter unless it is sore. Trim the feet level, fit your shoe so that the bar covers or presses on half the frog; this will spread out the quarter to where it is wanted. The shoe should also be used in all cases of broken down quarters or quarter cracks. After leveling the foot and fitting the shoe I always lower the heel next to the corn so that the pressure comes on the frog and not on the heel, Also see that the frog is in the proper state to receive the pressure. It must be soft and elastic. Never put pressure on a hard, horny frog. When the foot is in this condition soak the foot in water and oil it. This will soften it.

Chronic corns are nearly always found where one quarter is contracted and the only way to cure corns successfully is by frog pressure. You never find corns unless the quarter is contracted to a certain extent. Corns are usually the first stages of contraction.

I am pleased to read the many inquiries which show that horseshoeing has come to be a scientific work and requires just as much skill and study as we can give it. Knowledge will not kill any man and it is pleasing to see so many who are eager to learn. I read of some fellow who must have been born with a gasoline engine in him. The way he nailed shoes on horses and fitted them was something marvelous. Don't let us make the same mistake. Whenever we pick up a foot, let us remember we are work-

ing on one corner of one of the noblest animals God has given to man, and not on a block of wood. Let your skill do everything in your power for his ease and comfort, and your reward will be a good trade and lots of cash.

How many of the readers of THE AMERICAN BLACKSMITH have taken a course in anatomy and can display their certificate? If you, my brother, have not made a study of the physiological movements of the foot and legs and the anatomy of the same do so at once.

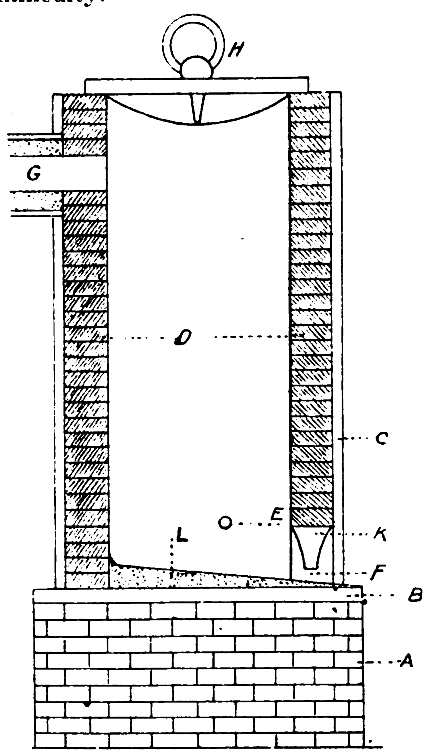
A Simple Cupola For Melting Iron

R. H. SOMERS

A simple cupola for melting iron may be a very elaborate contrivance or it may be made simply of a clay-lined cylinder. We will take up the making of a simple cupola with such directions and explanations as will leave the reader free to construct one for use in his own shop. Such a furnace is shown in the engraving and is made as follows: The foundation A of brick or stone is topped with a circular or square plate, B, large enough to leave a good margin between its edge and the bottom of the sheet iron cylinder.

This cylinder C, after the proper holes are cut for the tuyeres, the tap hole and the flue is lined with fire brick D. In laying the bricks, care must be taken to get them as close as possible. They should be laid in a good quality fire clay, which is used in such consistency to pour readily from a dipper. The fire clay used as a binder should be applied freely, so as to protect the bricks as much as possible from the influences of the flame and hot gases. After the lining has been built it is worth while to go over the inside carefully and patch up any crevices and all the bricks found unprotected from the heat.

The tap hole at F should be four inches high by three inches wide and dome shaped. The holes E for the reception of the blast pipes should be $1\frac{1}{2}$ inches in diameter and located four inches above the bottom on opposite sides of the cylinder. The flue G should have a diameter equal to about $\frac{1}{3}$ that of the cupola and should be protected as much as possible from the oxidizing influences of the cupola gases. This protection may be effected by lining the pipe, which may be of any suitable material, with fire clay. The cover H is made to fit the top of the cupola to keep the gases from coming into the shop. This cover should also be lined with fire clay or other protective material. These dimensions are for a small cupola from $2\frac{1}{2}$ feet to 3 feet in diameter, with a height of from 3 to 4 feet. The foundation should be just high enough to allow the crucible to be placed beneath the spout without difficulty.



A SIMPLE CUPOLA FOR MELTING IRON

The furnace is now practically ready for operating except that it is best to dry out the lining thoroughly before the first heat. This will take the moisture out of the brick and clay lining and will do much towards the lengthening of the life of the lining. Before starting the fire to dry the lining, cover the bottom of the cupola with sand to a depth of about three inches. This is packed lightly and a fire at first of fine kindling and finally of coal or coke is started. The fire should be of considerable depth, and after thoroughly igniting should be left to burn itself out by closing the tap hole and the tuyeres. The ashes and cinders may then be withdrawn by way of the tap hole and the cupola prepared for the first heat or charge. The bottom is then again prepared with sand, but in this instance more care must be exercised in the preparation. The bottom should slope slightly, as shown at L in the engraving, and in packing the sand care must be taken so as not to get the sand too hard nor too loose. The protection of the tap hole with fire clay, as shown at K, must also be carefully made so as to insure the safety of the operator when tapping. The tap hole is best made small, as it is then less difficult to stop the flow of hot metal. The tool for tapping is simply a long iron bar pointed at one end and with a handle at the other end similar to the iron used by a stoker or fireman.

In building the fire for the first charge, shavings or other light combustible material are thrown into the cupola from the top, upon this light dry kindling and finally heavier wood followed by coal or coke. The shavings are now ignited and when the fire is burning brightly more fuel is added until the coal or coke is going well. The charge of iron may now be added, but do not make the mistake of adding this before the fuel is thoroughly afire. It is understood of course that the charge of metal and fuel are alternated after the fire is well under way. The ratio of fuel and metal used should be one of fuel to seven of metal. The operator of a small cupola built upon the foregoing plans will hardly find it necessary to use a flue as used in the operation of a large furnace. After the entire charge has been placed in the furnace the cover may be replaced, the tap hole closed, and the blast started.

Hickory—2

Sources, Uses, Preparation, Marketing and Suggestions

CHARLES F. HATCH
Statistician in Forest Service

The packers prefer split cordwood, in 4-foot lengths, and seasoned from three months to three years. Tops and limbs are seldom accepted, although round pieces down to 2 inches in diameter can be used. Table 2 shows that of the 31,207 cords of hickory used 28,008 cords were in the form of regular split wood from 1 to 4 feet in length; 2,560 cords were in the form of poles; and 639 cords were in miscellaneous sizes and forms, such as limbs, tops, slabs, scraps from shops, and waste from vehicle manufacturers.

It seems unreasonable to expect packers located near the hickory supply to substitute inferior woods. A wider use of pecan and of hickory waste from the factory and the woods, however, is strongly urged. A number of packers are now using this material as part of their supply. Its more general utilization would save an appreciable amount of the better material needed by the manufacturers of vehicles, handles, and other special hickory products.

TABLE 2.—*Woods used for smoking meats*

Species	Cords	Species	Cords
Hickory:		Gum	6
Split wood (28,008 cords)		Maple	8,655
Poles (2,560 cords)	31,207	Mountain mahogany	36
Miscellaneous (639 cords)		Miscellaneous woods	944
		Oak (miscellaneous species)	6,809
Apple	12	Oregon oak	342
Ash	154	Pecan	85
Aspen	50	Poplar (Utah)	40
Beech	1,417	Sycamore	13
Birch	8	Utah white oak	10
California live oak	50	Walnut	24
California white oak	1,361	Western alder	792
Chestnut	233	White oak	85
Chestnut oak	15	Yellow pine	59
Cottonwood	745		
Elm	200	Total (woods other than hickory)	22,155
Fruit trees	10	Total (all woods)	53,362

No one knows how much hickory is consumed for fuel. One estimate places the amount at 1,000,000 cords a year. That is probably too high. If not, it exceeds in quantity the combined demand for hickory for all other purposes. It is well known, however, that the cutting of this wood for fuel has long been a serious drain upon the supply. More than a century ago A. F. Michaux, a French traveler in this country, sounded a warning that if the cutting of hoop poles continued and the felling of large hickories for fuel was to go on, the United States would be without hickory in 50 years. His prediction was not verified, but there was much ground for uttering the warning; and if the warning was timely then, it is timely still. Even if the output of cordwood for fuel is only one half of what it has been estimated, it is a most serious drain upon the hickory supply. In many cases the cordwood cutter takes waste only, but too often the whole tree goes into the fuel rick.

Lumbering and Milling

More than 5,000 mills were cutting hickory lumber in the United States in 1908, as reported by the census, and the output approximated 200,000,000 feet. It is necessary to distinguish clearly between hickory lumber and other forms of the wood. Gear woods, rims, and many other commodities may or may not pass through a sawmill. If they do not, they are not listed by the census as lumber, and the 200,000,000 feet reported for 1908 did not, therefore, include all the hickory taken from the forests that year. How much it fell short is not known, but it lacked much of being all. A recent investigation found 131,000,000 feet in excess, or apparently in excess, of what the census reported. This was cut by small dimension mills into strips, billets, and various forms of vehicle and other special stock. Some of the 200,000,000 feet reported by the census was subsequently further manufactured into special stock, and some went into floors, bridges, barns, fences, and other similar places. Much hickory is split into billets and never goes to a sawmill or dimension mill. Lathes and other machines finish the products.

Hickory is cut by sawmills and dimension mills of all kinds from comparatively large to very small. The sawmills cut the log into lumber, which later is often ripped into dimension stock. The dimension mills cut the log or bolt directly into pole, shaft, and rim strips, spoke billets, handle billets, and other rough dimension stock. Many of the mills are portable and operate on small bodies of timber or in communities where scattered trees may be brought to a single point in quantity sufficient to warrant the placing of a mill. A full account of hickory-mill practices would be too long for the purposes of this report. Methods in one region may differ from those in another where entirely different conditions are met. In general, however, most of the hickory is cut by small dimension mills. It could not be otherwise where growth is scattered and timber scarce and where mills must frequently move from place to place in search of new stands. Some mills cut hickory exclusively; others handle it along with oak or other hardwoods. In some instances large sawmills log this timber as they come to it in their usual operations, but they do not go out of their way to find it. Others prefer not to cut it at all, since they are not prepared to handle it conveniently. Such mills sometimes leave hickory on tracts of thousands of acres from which the other timber is cut. One of the important problems of the hickory situation at this time is the utilization of this remaining thin stand of hickory. Operators do not find it profitable to take it out along with their other timber. They move on, and their log roads go to pieces, their bridges rot down, and their skidways decay or are removed. The hickory is so scattered that the expense of making a special operation to take it out, involving the construction of new roads and bridges, would cut profits very low, or might even involve a loss. Fortunately, hickory is little susceptible to injury from wind after the surrounding protective timber is cut away, and it can wait a long time for its market. Nevertheless, it stands idle while many industries need it.

During this investigation a number of lumber companies which leave hickory in this way have been questioned to ascertain their interest in one or more propositions to sell the hickory to the special users and thus realize a profit on it. Three propositions were submitted to them, as follows:

(*a*) We could furnish——feet per month for——years to a dimension mill located at our sawmill, providing we could secure $——for our hickory stumpage and make satisfactory arrangements for cutting the trees and hauling same to our cars.

(*b*) We could deliver the logs at our mill or at a dimension mill near us for $—— per 1,000 feet b. m., and we would look after the cutting and hauling; on this basis we could furnish——feet per month for ——years.

(*c*) We could furnish——cars of hickory logs or bolts per month to a hickory dimension mill located at a distance from our mill and could furnish the logs at $—— per cord f. o. b. our mill.

A few companies replied that their supply of hickory was too small for them to consider disposing of it in the way suggested. Other concerns, however, showed great interest in the proposition, one of them reporting 5,000 acres in one body which will cut over 2,000,000 feet of hickory.

This company is building a logging road through its hickory land, and desired to get in touch with a hickory user by the plan outlined under (*a*) or (*b*). Another concern reported 15,000,000 feet on 150,000 acres, and stated it could supply a special user for 10 or 15 years by the terms of either (*a*), (*b*), or (*c*).

Most mills cutting hickory are equipped for special dimension stock —sucker rods, poles, shafts, handles, spokes, skewers, and parts of farm and textile machinery. One mill may not cut all, but several of the dimensions; others cut one or two. Each kind of mill strains a point to get out of a tree, or from a tract of hickory land, as much stock as possible for its particular purposes. This is known as specializing, and the practice has been criticized on the ground that trees capable of yielding long pieces of clear material are worked into short-length products—an uneconomic practice.

It has been popularly supposed that much waste accumulates about the special mills or in the woods where their logging operations are carried on; but this investigation did not find as much waste as had been reported. This is particularly true throughout the territory where hickory is now most abundant. In such localities the manufacturers of various hickory products have advanced their portable mills until they all operate quite close together. The farmer owning a tract of timber, therefore, meets representatives of two or more industries and sells to the highest bidder, all bidders meanwhile having estimated the timber for their special purposes. The millman making the longer-length products gets more money out of the tree and can afford to pay more for it. He, therefore, probably outbids his competitors, secures the tract, cuts for his purposes, and sells the remaining trees to the manufacturer of the shorter-length products. In the territory where hickory is now scarce or where the operators are more scattered and competition therefore less keen, however, the entire tract is more apt to be cut over by a single manufacturer, who leaves in the woods or wastes at the mill whole trees or parts of trees not useful for his particular purpose.

Unnecessarily high stumps are an important item of waste, since some of the best wood is near the ground. Data compiled during this investigation show that the millmen are improving their practices of a few years ago. Table 3 shows that 13 per cent of the mills reporting cut their stumps as low as 6 inches; 40 per cent cut to 12 inches; 32 per cent to 18 inches, and 15 per cent to 24 inches or over. Stump waste is greatest in open-grown, short-trunked hickories.

Trees left standing in a remote situation are not wholly waste. They serve as seed trees, and with the aid of wind, water, birds, and rodents, they may stock much open ground with seedlings for the country's future hickory supply.

Occasionally logs are cut several inches longer than necessary, and thus several inches must be thrown away. Another waste results from splitting stock instead of sawing it. Much wood is lost because of small defects which a saw would remove, but which can not be split out without sacrificing more or less good timber.

Damage by Insects

More than 150 insects prey upon hickory, some on the green trees, some on logs after they are cut, and some on seasoned lumber or products. Those which attack the living leaves, twigs, bark, and wood may be dismissed without special mention.

TABLE 3.—*Hickory dimension—Mill practices*

	Number of mills reporting	Per cent
Saw gang paid:		
By day	311	66.9
By contract per M feet	154	33.1
Average height of stump:		
6 inches	48	13.3
12 inches	145	40.2
18 inches	113	31.3
24 inches and over	55	15.2
Logs transported to mill:		
By horses	320	40.1
By mules	232	29.1
By oxen	116	14.6
By tramways	30	3.8
By railroad	99	12.4
Log or bolt cut to increase output of sapwood	140	48.6
Log or bolt not cut to increase output of sapwood	148	51.4
After manufacture, product is piled under sheds	203	45.1
After manufacture, product is left exposed	247	54.9
Product is sold by established grades	225	77.6
Product is sold by mill run *	65	22.4
Product is shipped in solid car lots	123	44.6
Product is shipped in mixed car lots	153	55.4

* "Mill run" is clear stock, not separated into grades.

They sometimes do considerable injury, but the amount is not easily estimated in terms of feet and dollars. When attack is made on logs in the woods, on skids, or in the yard waiting for the saw the damage is more visible and can be estimated. The wood is perforated with holes of considerable size, and nearly 8 per cent, on an average, is thus destroyed. The chief injury is done before the inner bark becomes dry. Loss may be lessened by keeping the logs off the ground, thereby hastening the drying of the bark; or if they can be kept under water the insects can not enter. Another way to lessen loss is to hurry the logs to the mill and convert them into lumber or other products before beetles have time to bore them.

When hickory passes through the mill and goes to the yard or shed and is seasoned it becomes subject to other injuries which may do more harm than was done while the logs were in the woods or the mill yard. Such injuries include damages by powder-post beetles, other wood-boring insects, and losses due to checking, warping, and staining. Statistics from a large number of mills show that 5.2 per cent of the manufactured product is spoiled by the powder-post beetles, an additional 7.6 per cent by other wood-boring insects, and that 4.9 per cent is lost in seasoning.

The powder-post beetles are so called because they convert dry wood into fine powder. Their presence is detected by the appearance of the powder on or beneath the wood. The beetles are very small, and are not likely to be seen unless looked for very carefully. Large quantities of seasoned hickory, both finished and unfinished, are sometimes ruined by them. They operate most destructively in wood which has been seasoning a year or more. It is possible to lessen or prevent this loss, but vigilance and promptness are necessary. If a lot of wood becomes

infested with powder-post beetles not much can be done to save it, but steps should be taken to prevent the spread of the beetles to other wood. Infested stock and near-by material which has not yet been attacked should be sprinkled with kerosene oil. Stock should not be kept on hand longer than necessary, because there is always some risk that beetles may get into it.

Marketing Hickory

Hickory is marketed unlike any other wood. The sawmills cut other hardwoods for a general market, through which it is distributed to the user. This general market studies the demands of the trade as a whole and calls on all mills cutting each kind of wood to furnish certain sizes and grades for which the trade is in need. Little hickory, on the other hand, goes through a market or distributing yard. It is chiefly cut for a special industry and sold directly to it. Each industry has its own mills in the hickory-producing territory and comes into direct contact with millmen cutting its raw material.

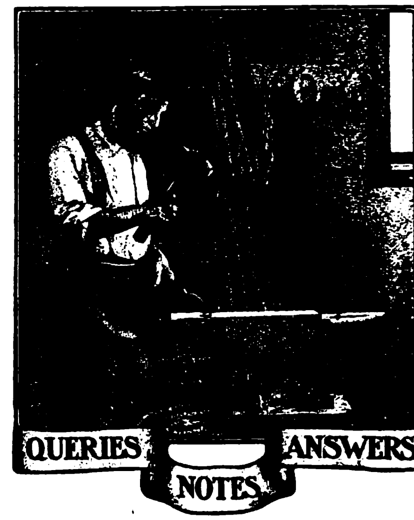
The little hickory that gets to the wholesaler is chiefly cut $\frac{5}{4}$ inch and thicker, suitable for re-manufacture into the stock required by the vehicle man or other special user. The inch stock is cut only to square the log and to prevent heavy slabbing. Several hundred wholesale yards were investigated, and of these only two out of every five included hickory.

A considerable amount of wood is disposed of to exporters. This is true chiefly in the Gulf region. The practice has been complained of by manufacturers in this country who look with little favor upon the shipping of hickory to foreign countries when it is needed at home. While it is true that all the good hickory is needed by American manufacturers, the man who has it for sale will sell where the price is best; nor is it practicable or desirable that trade should be restrained by laying an embargo upon this wood. Sometimes the long haul to the factory with the high freight, and the short haul to the exporting point with the lower freight, control the direction which the shipment takes. If, however, the extra rigid inspection of export stock results in throwing out so much of it that the actual profit to the seller is not greater than if he had sold at home, the export of hickory will fall off, and the home factories will get what otherwise would have gone abroad.

A leading manufacturer of long and short length hickory products has in successful operation a plan by which chance and accident are largely dispensed with in cutting and marketing hickory, and waste is reduced to a minimum. The company is fortunate in owning or controlling a number of mills, and also a number of factories where the sawmill products are worked up. It is thus in a position to try out plans for controlling both supply and demand, so far as its mills and factories are concerned. A yard has been established at a convenient freight-breaking point between its southern dimension mills and its northern manufacturing plants, and all inspection is done at the yard. The mills ship their rough stock to that point. It is there carefully separated by sizes and grades, and is piled under cover. Since each mill sends all it saws, it can make frequent shipments without waiting to accumulate certain quantities of specified sizes and grades; and, since several mills are constantly forwarding their cut, the yard is kept supplied with all kinds of products.

The yard sees to it that all the factories are furnished with the sizes and grades needed. It is in a position to notify the mills when certain stocks are short and to order new supplies. By anticipating future wants the factories can have special orders filled against the time of need. In short, the yard is the central point from which the operation of the mills is directed, on the one hand, and the wants of the factories are looked after, on the other.

The successful operation of this plan by a single concern has suggested its adoption by an organization of all hickory factories. Most of the factories are in the North, but a number of them are South. Many northern factories have also established main stationary mills in the South which rough turn the stock sent in by the small portable mills and ship it to their northern factories to finish. The northern and southern factories and stationary main mills own or back a large number of the small portable mills, making spoke and handle billets, rim strips, and other rough pieces. In many cases the small mills are independent, but on account of nearness to a particular factory or main mill are forced to sell their entire output to it.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Plow Work.—I would like to see more information along the lines of tempering plowshares. A. L. Edens, Texas.

To Shoe a Colt.—I am shoeing a four-year old colt that is a fine-gaited pacer with but one fault, that is, she travels too wide in front. Please have someone tell me how to make her travel closer with the front feet, for she has been driven enough to be out of any colt gait.

Berne Walton, Utah.

Removing Spoke Tenons.—What is the easiest way for removing spoke tenons when they are broken off in the hub? I always have to bore them out, knock the box out and then drive them out. If any brother smith has an easier way I would like to hear from him.

Louie Gillmann, Jr., Tennessee.

A Question On Wheels.—Will some fellow readers let me know their opinion on bolting buggy wheels between every two spokes? In my opinion it is absolutely unnecessary that there should be over three between the joints of bent felloes? Two in small wheels are enough when the tire is loose. It should be set so that the bolts do not tighten it.

A. F. Behrman, Colorado.

To Tame a Horse.—To make a horse follow you like a pet dog, or to tame a spirited one, take fifteen drops of the oil of aniseed, ten drops each of the oils of cinnamon, nutmegs, rosemary, thyme, and the tincture of opium, and mix them well together with two drachms of orris powder and apply to the horse's nose with the palm of the hand and you may do anything with him. Fred Howard, England.

A Business Change.—The firm of F. S. Goetsch and Son, general blacksmiths and dealers in farm implements and gas engines, have purchased a half interest in the firm of Struble and Hiltenbrand of Naperville, Illinois, who have conducted a wagon and carriage business for forty years. Mr. Struble has retired, and a partnership under the name of Hiltenbrand and Goetsch will continue the business along the same lines.

Some Foundry Questions.—I would like to see something about light foundry work in "Our Journal." It would be a great help to blacksmiths in out-of-the-way sections of the country like this if they were able to make small castings at times. Could you give instructions for making and charging a small melting furnace? Would coal or coke be necessary as fuel? Also what to use as a flux? Could old iron, such as old cast wagon skeins and mowing machines be used? If a crucible is used what kind and size of blower would be needed for a given size furnace, and how fast it should run, and how the air should be delivered to the fire? Also the style of tuyere to be used?

FRED LE CLERC, New Mexico.

A Letter From Missouri.—I have been reading your valuable paper for the last ten years, and I have learned quite a few hints from the same. My father started in business here in 1879, and when he was compelled to retire I purchased the stock and tools and have done the work alone ever since. In 1908 I bought out a wood-working shop. The only help I have is a gasoline engine and some wood-working machinery. I sell buggies as a side line. In the winter, as work is slack, I build farm wagons which my customers prefer to factory wagons. My line consists of wagon work, plow work, horseshoeing, wood work and painting. My shop is 20 by 75 feet and contains a band saw, emery grinder and large grindstone, four feet in diameter, and a power drill press. I run my machinery with a Weber 3½ H. P. gasoline engine, which is always ready, for I need it. MISSOURI BOY.

A Letter From the Lone Star State.—I have been doing blacksmithing for eight years; having spent one year in a machine shop and auto garage I have returned to my old trade. I do auto work when one drops in, but not a great many come this way on account of the bad roads. I have a power-equipped outfit with a Waterloo engine, of which I also have the agency as a side line. The main work consists of horseshoeing, plow and wagon work, but I also make bridle bits and spurs, plain or silver mounted, have some gun work and do a great deal of soldering and tin work. There is no one in town who does tin work. I also handle plow points and sweeps, etc., through the plowing season.

I note some of the brother readers object to cold tire setting, saying the work was not satisfactory, it kinked the tires, etc. Doubtless this was through carelessness or lack of information as to a cold tire machine. I have a Mayer's Power Machine and I like it better than the other machines I have used. If a tire is properly put in the machine and the work carefully done there is no need of kinking the tires.

I think we have the finest paper published for blacksmiths. It's a dandy. I wish more of us could get interested in holding up prices. I have competition here that is slashing considerably. It is a disgrace to the craft and a drawback to the trade. A man that will indulge in such is helping "Poverty knock on his own door."

J. L. J., Texas.

How To Gum a Circular Saw.—In answer to Mr. Luke Blabey's question on saw gumming, First: For marking saw take something like No. 14 or 16 gauge sheet iron. Make a pattern of your saw tooth from one point to the other, file out the throat and front rake of tooth. Get your curve from the throat to the next point and shape it correctly. When you get your pattern made correctly lay it on your saw with pattern points and saw points together correctly, and scribe with scratch awl. Move to the next tooth and so on around your saw.

Second: For size and thickness of emery wheel I would judge about ⅜ by 14 inch would do most any kind of gumming that you would want. It would be the best to get the diameter of wheel to suit the speed of your shaft. If your shaft should run at too high speed a 14-inch wheel would be dangerous, while a 10-inch wheel on same shaft would possibly be running too slow to do good work.

Third: Device to gum saw with. The best way I have ever found is to take 2 by 4 piece of timber about 12 feet long; lay it on something at each end 8 or 10 feet overhead; hook common logchain around it in the center; drop the other end through eye of saw; slip ½-inch bolt or toggle through chain the proper height to hold saw slightly above the level of the emery stand, then when you are at work if your saw should jar you can make slight pressure on the center or slack the pressure, just as you see fit, to make saw blade lie level on the emery stand.

H. C. STEWART, Kentucky.

Ideal Business Conditions.—I began my work as a Master Blacksmith in the L. T. N. R. R. Shops at Birmingham, Ala., having worked my way from helper to assistant foreman under James Quinn. I had a good chance to learn the trade. The old smiths that were there at the time I was were true gentlemen. They have helped me out of lots of hard places. In my fourth year I was given frames to weld, cradles to shorten, in fact, any piece of work from a locomotive could be brought to my fire. I learned to love those old smiths in my younger days. I have been at the trade since 1894. For the last five years I have been running a custom shop, which I like much better than working for wages. I have an iron-clad building, 50 by 75. My equipment is a 6-horsepower Hagen engine, wood-boring machine, planer, band saw, grind stone, blower, emery stand, drill press, Little Giant trip hammer, House cold tire setter, three forges and one Barcus shoeing stock, and other tools needed in an up-to-date shop. I have all the work I can manage to do. I have two competitors. They are both good brother craftsmen in every way. In fact, we have got as good shops and smiths as there are anywhere. If one shop is short of material or a machine to do a certain piece of work he goes to his competitor and borrows or uses his machine and is welcome. If I have a bad horse to shoe and need more rope I go and borrow it, and I feel welcome.

I won't work for a man on credit that has not settled with my competitors, and they are the same with me. If he will cheat them of a year's work, he will do me worse. We all have one price list, gotten up and approved by all three shops.

J. D. HAWKINS, Texas.

THE ELECTRIC POWER SHOP OF MR. T. C. PEDIGO, OF TEXAS

A Tempering Solution.—Hardening Hammers. I saw in a recent number that some brother blacksmith wished a temper for masons' steel tools. The following is a very good solution that I have used, and which has never failed when the steel is properly treated. Two ounces of oil of vitriol (it must be clear oil of vitriol), two ounces of washing soda, one half ounce of niter. Mix the soda and niter in two gallons of pure, clean water, add the oil and let stand for one half hour until the beads stop on top. It is then ready for use. The soda is for carbon and the oil of vitriol for hardening, the niter for toughening.

When hardening hammers I do not run a temper. I heat the hammers as much as the steel will allow, get a strike from my apprentice and hammer them closely till the scale is cleaned off and then close in the grain and plunge them in a bath of cold water. When cold I treat the other end the same, keeping water on the end that is finished to keep it cold and not let the temper run off. This is the method I use and have never had one break or soften.

I do horseshoeing and all kinds of blacksmith work connected with the farm, such as plow and harrow work, curb mounting, wheel ringing for carts, binder work, repairing all kinds of implements, and sometimes I make some new ones.

About cold tire setters, I am of the same belief as the people in this locality, that is, that they are of little use. Here our rings (tires) for carts range from 2½ by ¾ inches up to 1⅛ inches thick, and I think the cold tire setter would be of little use in this country. We have a hydraulic press for them. They work, but they press all around and not in one place. They are on the flat and not on edge.

JAMES KIDD, Scotland.

A Word On Several Topics.—I have worked at the trade fifteen years, and have a shop 32 by 60, and as many if not more tools than any shop in the country, i. e., lathe, trip hammer, cold rolling disc sharpener, power drill, emery grinder, rip saw, band saw, spoke and tenoning machine, five-foot grindstone, eight-horsepower gas engine and all the other smaller tools necessary to make up a first-class shop, and last but not least a cold tire setter.

Now I have never tried to drive spokes up on felloes nor even wedge them. I hardly think the machine was made for that kind of work, at least, it was not guaranteed to do that kind of work, but it will set tires not only to my satisfaction, but to my customers'. I can do better work with the cold setter than I ever could hot, especially on poor old worn-out wheels.

I do not doubt a man's ability to sharpen fifty or seventy-five lays in a day, nor that it would take another man all day to get them back on the plow or lister after they had been sharpened. At that rate he would have the biggest job. The only thing I would like to know is how he gets that many lays to sharpen per day. I live in one of the greatest corn raising districts of the United States, and no shop in this section ever sharpens half that number per day.

I have no time for side lines, for I am kept busy handling everything that belongs to the trade and repairing everything that comes to a general repair and machine shop. The up-to-date shops of this country are doing a good business and making money. The Tom Tardy shops are here because they can't get away; they never charge for anything because they never do anything, and they never do anything because they have nothing to do, and the truth of the matter is they don't want to do anything.

B. E. Robinson, Missouri.

A Column of Old Shoes.—I am sending a photo of myself and my partner taken in our shop. The column to our rear is of old shoes which we have taken off in about eighteen months. For the month of January we averaged daily from 75 to 100 shoes. This is a pleasant and prosperous town situated in a good farming country, and a good price is obtained for our labor. We are very much pleased with the Capewell nail advertised in your paper, using them altogether, and think them to be the best nail on the market. We always buy them in 250-lb. lots. Our shop is a general shop. We do shoeing, rubber tiring, wagon, buggy and plow work. I, the man to the right in the picture, am an Englishman, having been in this country three years and I find a vast difference between the work here and in England. I served five years' apprenticeship in England and was accustomed to making my own shoes, while here the machine-made shoes are used. We made seven dozen for a day's work from new iron and four dozen from old shoes. I find as I travel through this country there is not one man in ten can or ever did make his own shoes. And I agree with my brother blacksmith that every blacksmith should be made to pass a certain degree before qualified to run a shop, making it a great deal better for those men who are good mechanics. I think The American Blacksmith a fine paper and one to which every blacksmith should be a subscriber. I always watch anxiously for it each month, and invariably find many good and useful things in it. I am always interested in Mr. Benton and, in fact, all contributors. George Stephenson, Ohio.

What One Cold Setter Did.—After making a careful study of cold tire setting, beginning about ten years ago, I bought a cold tire setter four years ago, and my experience with my machine may help some brother smith in a practical way to decide whether to buy one or not.

In the first place before I bought my setter I thought like some other smiths that they were so costly that I could not afford one and besides I did not feel sure that they would be a success. But let me tell you what decided me to try one. I had read, as I say, all I could find about cold setters, and one day I received a copy of "Our Journal" with some letters in it on cold setting and some on hot setting. In my judgment the cold setting had the best of it, as it seemed to have had in other articles and literature that I had read, so far as theory goes. Well, that very day that I had read those letters in the Journal, I got an offer from a cold setter company making me some mighty liberal terms and I just concluded that I was interested enough in cold setting to chance the little money they asked me to pay down with the order, so I sent in my order. Well, the machine came right along and when it arrived at the depot my advertising from that machine began. I live in a small town and a tire setter was next to a circus. I had told some of the boys about ordering it and they had told others and so when the machine was put off at the depot there was plenty of help handy to lift it out and on the dray. Seemed like every man on that platform wanted to get his hands on that machine, and they all followed the setter to my shop and helped unload. I counted the boys and there was an unlucky thirteen of them. I am not superstitious, but my wife is, and I guess it was out of respect for her beliefs I happened to think it was the 13th of the month, too, so I just said nothing to her about the machine getting in that day but waited until the next. But here is what I want to make plain first, that I never was so surprised in my life as I was the way that tire setter brought folks to my shop. All my old friends and customers come in more prompt, no doubt, than they would have and then every day some stranger or some competitor's customer would shy in and quietly take a glance at the machine and then we would have a talk about it and other tools. Well, by the time the setting season came on I guess every farmer for miles around knew about my setter. I had had it then three months or more and had set a few tires for customers besides practicing and learning the machine. Now the company I bought it of had sent me lots of circulars and letters and had kept telling me how the setter would build up new trade besides all it would do upsetting tires, and they furnished me a nice little book all arranged to keep track of the tire setting I did for everybody, keeping my old customers separate from the new and then a place to keep track of all the other repair work that was brought in by any new customers that the machine had brought to me, and here is my first year's earnings of that setter.

MR. GEORGE STEPHENSON AND CO. BESIDE A COLUMN OF WORK

Tire setting for twelve months—723 tires at 50c—$361.50, which was more than twice the upsetting I ever had before in this shop any one year. Then other repair work from new customers that the setter brought to me, not including their tires, thirty-seven new customers and $392.15, making an average of over $10.00 worth of repair work from each of these new customers through the year, while these same thirty-seven new customers brought me only $81.00 worth of upsetting, showing how the value of a cold setter is increased when you give it credit for all it earns.

Now, of course, my experience is such that I know the cold setter is a success in every way with me. But I have been careful to follow all instructions about the machine and how to make it draw trade, and after four years of steady use I can say that it is the best paying tool a blacksmith can own, by far, and that the price of it which looks so big at first is really not in the way at all, for they give you terms on the machine that give you a chance to pay for the machine out of what it earns. Mine did. My machine cost me $275.00 and the freight, and when I made my last payment on the machine it had already earned $768.20, figuring its full earnings as I have told you.

As I said, I have had my machine four years (it is just as good as when I got it, barring the possible wear and tear which I cannot detect), and the last three years it has earned me more money each year than it did the first.

Now this four years' experience has taught me a great deal about tire-setting, and what I have to say on the subject I hope will be worth something to some smith who is thinking of buying a cold tire setter. I have proved beyond a chance for doubt that the kind of cold tire setter I am using positively controls the whole process of upsetting from start to finish. All the guesswork of the hot way is done away with at the start. If any wheels need repairing I always repair them just as I did the hot way, and this repairing is done without needing to first guess on the amount of shrink, because the machine takes the tire at any reasonable looseness and draws it up accurately to any degree of upset that you want. So I have saved time even in getting the wheel ready to upset cold, not having to trace the wheel, etc. This doesn't amount to near so much saving, of course, as doing away with fires and stopping to heat the tire. But leaving out all difference of time and labor saving, the great advantage of the cold way is the superior and more accurate results that you get. This prolongs the life of the wheel and is the best kind of encouragement to the farmer to give you all his repairing and to send other farmers to your shop. In this way a good business in all lines is built up. B. A. Brightman, Kansas.

TIMELY TALKS WITH OUR SUBSCRIBERS

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Our Annual Shop Number

We want photographs of shops—especially good shops. We want plans, descriptions and ideal arrangements for shops. We want descriptions and sketches of labor saving devices, stock cabinets, tool holders or stands. We want suggestions for easing labor in the shop, shortening steps, for cutting out unnecessary work. And we want these things for the coming shop number now in preparation. If you will co-operate with us we cannot fail to realize our ambition to make this the biggest; best and most interesting and valuable issue of "Our Journal."

Don't wait—send your items in as soon as possible. The sooner you let us have your article, photograph or sketch, the better we'll be able to make the paper—so do it now.

Buy or Sell

There's not a thing connected with blacksmithing or the allied trades that you cannot sell or buy through our want columns. And the cost is so small as to seem almost nothing at all compared with the thousands who read the ad. Just try out this cheap method of advertising. There are lots and lots of advertising campaigns that are confined entirely to the classified columns. And if what you want to buy or sell is in the smithing line you cannot find a better medium than the want columns of "Our Journal." If you want to buy or sell a second-hand machine, if you want a new employer or employee, if you want a new shop or to sell an old one, use our want columns. The cost is but a trifle, but thousands of smiths read them.

Up At Sneetz's Crick

Are you sufficiently interested in the poems that have been appearing in "Our Journal" to want a book of them? The Editor has written a number of poems under the initials "W. O. B.", and someone has suggested that we get them up in book form. Would you want a book of that kind? If there is sufficient demand among "Our Folks" we will publish such a book. It would be made up of many of the poems which have already appeared on the page with "Heats, Sparks, Welds," supplemented by others from the same pen. Let us know your wishes concerning this—would you care to secure a book of this kind at a nominal price?

Contents, April, 1912

It Encircles the Globe

Mr. Stites of New Jersey, blacksmith, subscriber and Honor Roll Leader suggests that it would interest "Our Folks" to know where and in what countries "Our Journal" is read.

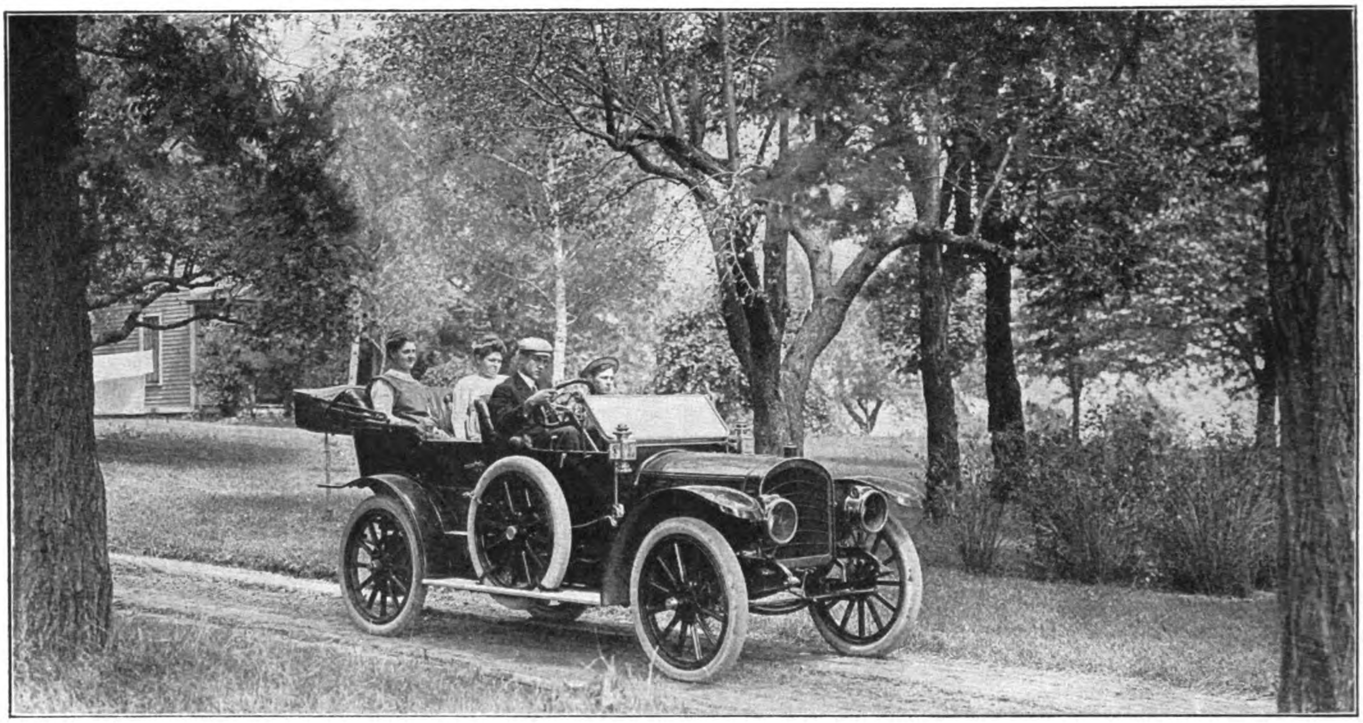
To sum up the matter at the beginning, THE AMERICAN BLACKSMITH is read wherever English is spoken and in several countries where English is not generally known.

We begin our journey to the shops of "Our Folks," at Buffalo, and first visit thousands of shops in the United States. We find ourselves in big railroad shops, in the little shop at the cross-roads, in the city shoeing shop and in the village smithy "under the spreading chestnut tree." From the United States we go south to Mexico and find "Our Journal" read by the smiths in the land of Montezuma. Continuing south we come to the Central American countries, Guatemala, Honduros and Nicaragua, each of which is the home of several English reading smiths who get "Our Journal" regularly. Going farther south we come to Panama and the Canal Zone where American smiths are reading THE AMERICAN BLACKSMITH and helping American Engineers to finish a wonderful work. Continuing still toward the south we find subscribers in Brazil, Argentina and Peru. Before leaving the Western Hemisphere we must visit the Bermuda Islands, Cuba, Porto Rico, and Jamaica, where "Our Journal" is by no means unknown.

We now cross the Atlantic to the British Isles and find many readers in England, Ireland, Scotland and Wales and in the Orkney and Shetland Islands. We find "Our Journal" in the London shops, in the quaint smithy of Wales, in the "Auld Shop on the Auld Sod" and in the shop in the "Land of the Thistle." From Britain we journey with short stops in Sweden, Russia, Germany and Portugal. We then go to Egypt where we find an American Smith on the banks of the Nile.

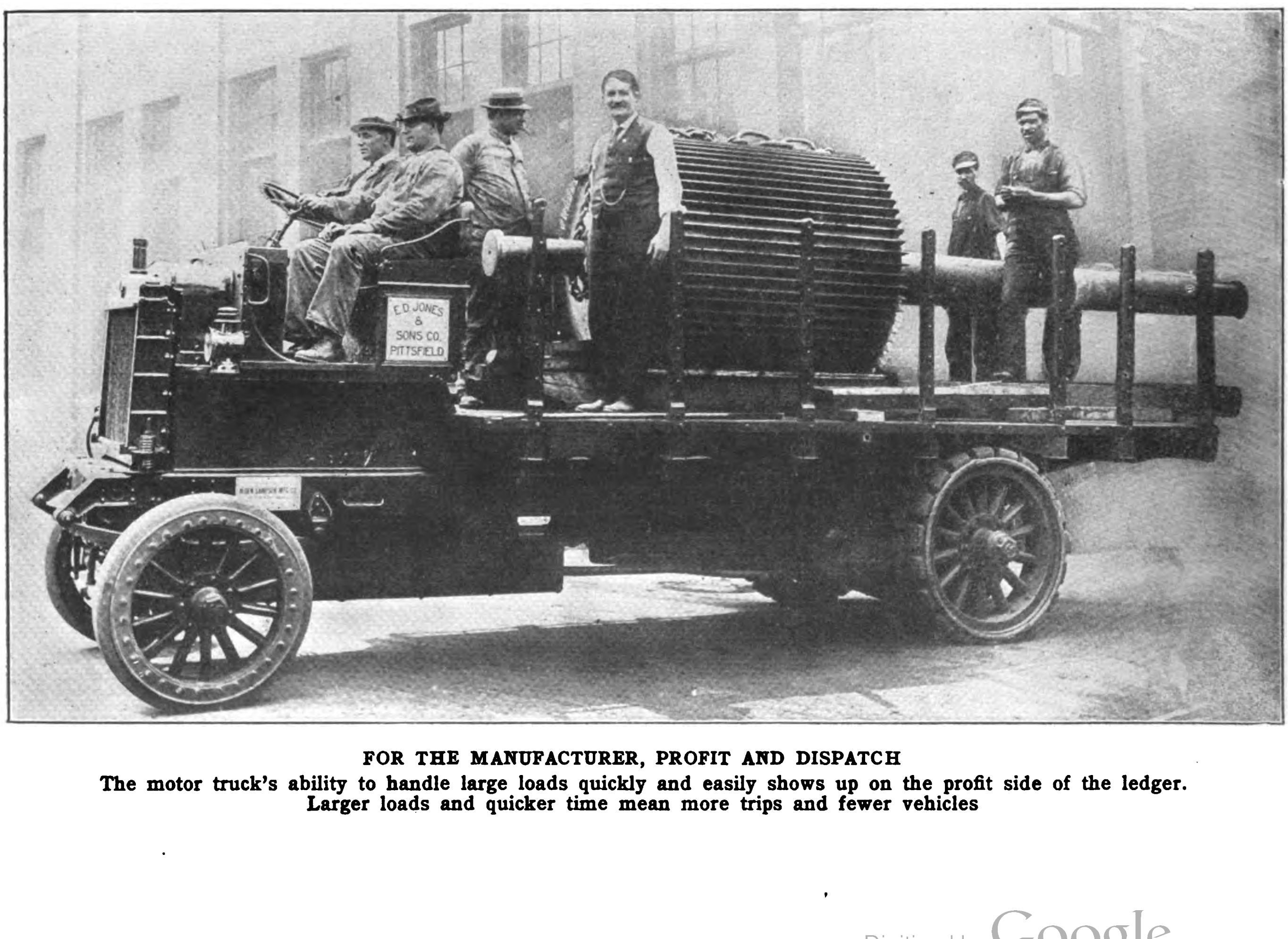
Were the "Cape to Cairo" railroad finished we would take one long ride to the south, finally arriving at Cape Town, the principal city of the Union of South Africa. Here we find many brother readers in Cape Colony, Natal, the Transvaal and Orange River Colony. We find "Our Journal" in the shops on the banks of the Orange River, on the shores of Delagoa Bay and in the heart of the Boer Country. We find readers in East Griqualand, Swaziland, Rhodesia and Zululand.

(To be continued)



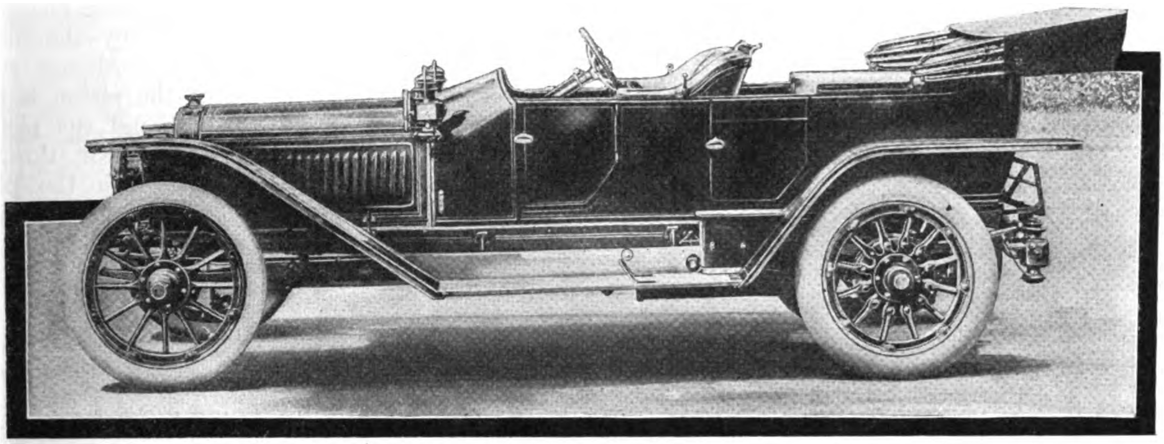
FOR THE FARMER, UTILITY AND PLEASURE

Needed implement repair parts are easily and quickly secured from town by means of the automobile. And after work a pleasant run through the country, to town or to a neighbor's, is relaxation for the men as well as the women folks at no tax on tomorrow's work horses



FOR THE MANUFACTURER, PROFIT AND DISPATCH

The motor truck's ability to handle large loads quickly and easily shows up on the profit side of the ledger. Larger loads and quicker time mean more trips and fewer vehicles



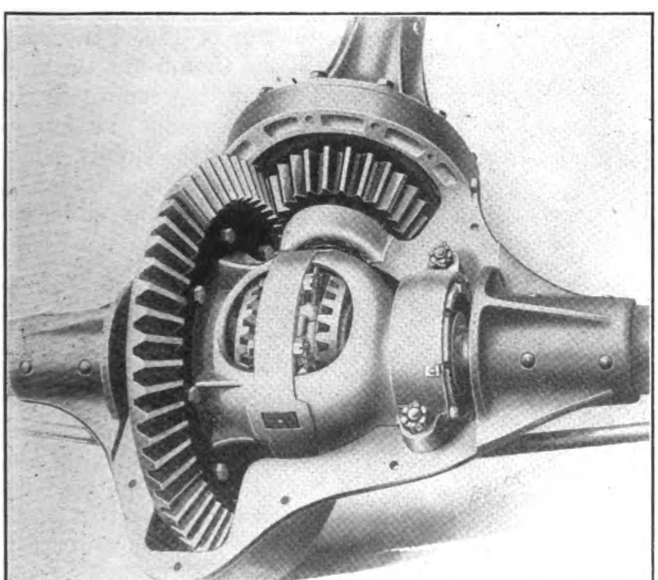
The Automobile Motor

Theory, Operation, Correction of Troubles

IN ORDER to be able to correct trouble in an automobile motor it will be absolutely necessary for you to have a rudimentary knowledge of what goes on inside the motor. We will go into the theory of gasoline engines far enough to show what happens inside the motor, and take away a great deal of the mystery which surrounds the average automobile from the beginner's point of view. These explanations and pointers, while with special reference to the Hudson car, are applicable to many cars.

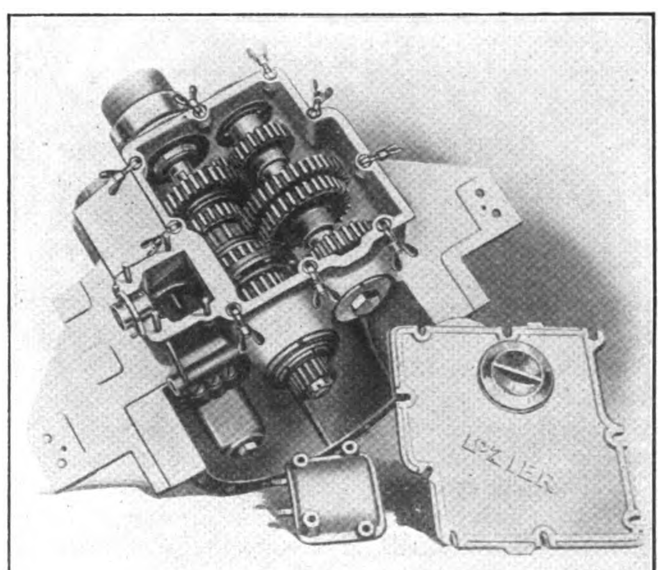
To begin with: In order to pull a motor car we must have some sort of power. The power agent employed in this case is gasoline. The gasoline, to give us the power, must be mixed with air in about the proportion of five thousand parts of air to one of gasoline. This mixture is highly explosive and gives a pressure of anywhere from 200 to 400 pounds per square inch, theoretically, but in reality ranging from 125 to 300 pounds.

Referring to Figure 1, we see the gas coming from the carburetor through the port (G) and the valve (I) into the cylinder, the combustion chamber of which is shown out of proportion to the real thing in order to make the illustration plain. We will assume that the mixture has been properly made at the carburetor, and take up the carburetor question later. The piston (P) is moving downward, as shown by the arrow, owing to its being pulled down by the connecting rod (R), which is actuated by the crank (A) on the crank shaft (S), which we will say we are revolving by means of the crank. The movement of the piston downward increases the size of the chamber, thus causing a partial vacuum, and at the same time the inlet valve (I) is lifted



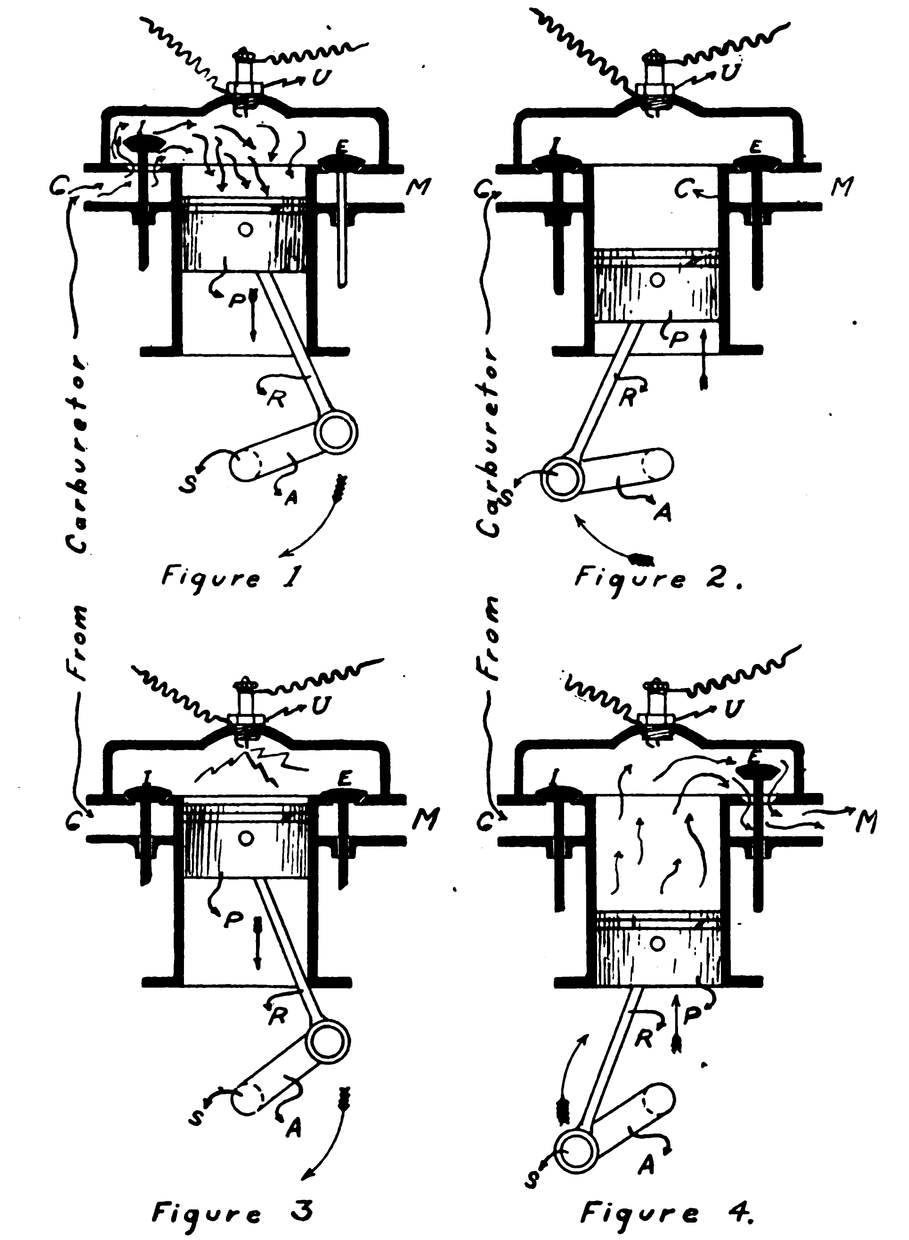
THE DIFFERENTIAL GEARS IN THE REAR AXLE

The cover of the differential case has been removed to show the large bevel gears for driving the rear axle and also to show the intermediate gears in the inner cage.



TRANSMISSION CASE WITH COVER REMOVED

The method of getting at the change speed gears differs in various cars. These gears should be carefully examined in overhauling a car and any broken parts or loose gears repaired.



WHAT OCCURS INSIDE OF AN AUTOMOBILE CYLINDER

mechanically and the gas rushes through the carburetor and the intake pipe (G) and from there past the valve (I) into the cylinder to fill this partial vacuum. The intake valve opens at the beginning of the stroke, or close to that, according to the ideas of the designing engineer. At the bottom of the stroke the intake valve will close, and we then have a volume of gas represented by the combustion chamber and the space in the cylinder.

As the crank continues to revolve, we refer to Figure 2, in which you see both valves closed. Therefore, the advancing piston is decreasing the size of the space containing the gas, hence putting same under compression, which in some cars ranges between 50 and 60 pounds per square inch. At the moment the piston arrives at the top of the stroke, or dead center (being when the crank (A) and the connecting rod (R) are in line), the charge of gasoline vapor and air is exploded by means of an electric spark, generally given with a spark plug (U), described later. Upon firing, the expansion of the gas is very great, causing the pressure of 200 to 300 pounds, and thus forcing the piston downward again, as shown in Figure 3, which is called the power stroke or the explosion stroke.

We now have had the intake stroke, the compression stroke and the power stroke. After the power stroke has arrived at the limit of downward movement we must get rid of the burned gases in order to be ready for a fresh charge. That is accomplished by the mechanical opening of the exhaust valve (E) the moment the piston is about to start upward, and the piston then pushes the gas out through this valve and through the pipe (M). The combustion chamber is about 24% of the entire volume at the end of the intake stroke, so that 75% of the gas is pushed out of the cylinder.

We have described the four cycles, each cycle being represented, as we have seen, by intake, compression, power and exhaust strokes respectively.

The Spark Plug

A spark plug is an instrument so constructed as to make an electrical gap across which the electric spark jumps and is to be exposed to the gases in the cylinder, firing them as a consequence.

There are many kinds of spark plugs, the most universal probably consisting of an electrode, or wire, running down through the center of a porcelain core, this being surrounded by metal threaded parts which screw into the cylinder, and from which the central electrode is insulated by the porcelain. The end of the central electrode is brought to within a short distance of the extension of the outer metal shell on the exposed part of the spark plug inside the cylinder. One wire from the magneto, or battery coil, is connected to this central electrode on top of the spark plug by means of the thumb nut thereon. The ground wire is connected to some part of the engine, or frame, thereby completing the circuit, when the spark jumps across the gap between the points of the electrode and the extension of the metal case of the spark plug.

In the engravings you will see two small wires extending down from the bottom of the spark plug, which is shown in the top of the cylinder. In this case the curved wire is simply an extension of the metal case of the spark plug. The straight wire is the end of the electrode going through the center of the spark plug.

For magneto service these extremities should be adjusted with a $\frac{1}{50}$-inch gap. If they are too wide apart there will be trouble in missing.

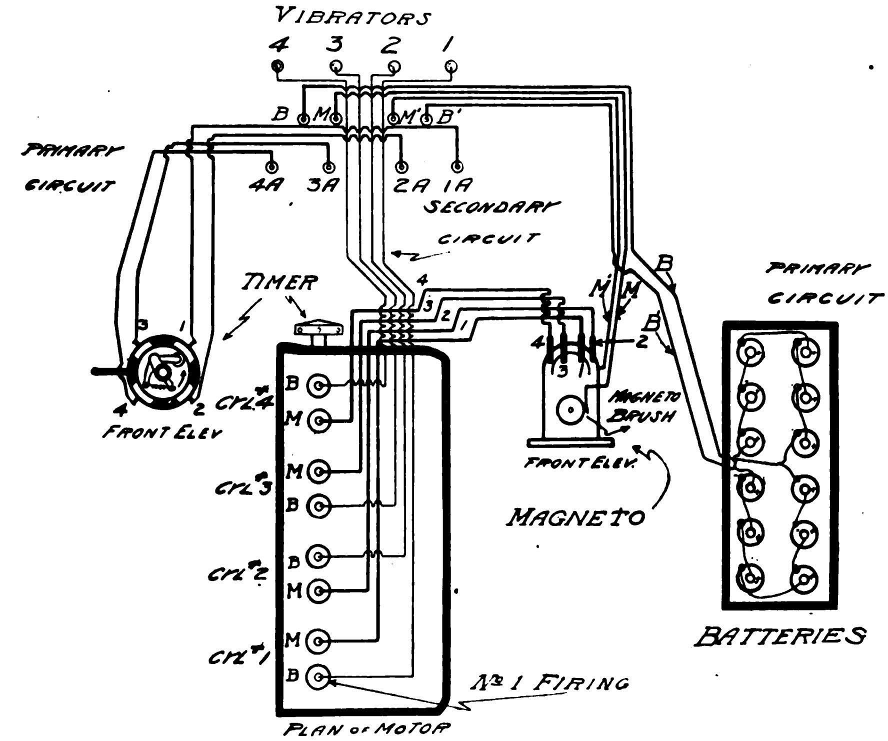


FIG. 5—A WIRING DIAGRAM TO SHOW HOW BATTERIES ARE USED AS AN AUXILIARY TO A MAGNETO

Wiring

The diagram, Fig. 5, will show how batteries are to be connected up, where they are used as an auxiliary to a magneto. Where batteries are used alone they should be connected in two strings of six each and worked from one string to the other through a switch, running one day on one set and the next day on the other set, thus greatly prolonging the life of the batteries. Dry cells gain considerable strength by a rest from work.

Note the proper position of wires on magneto, so that the wires leading from cylinders 1, 2, 3 and 4 may be inserted in the proper plug hole.

Starting the Car

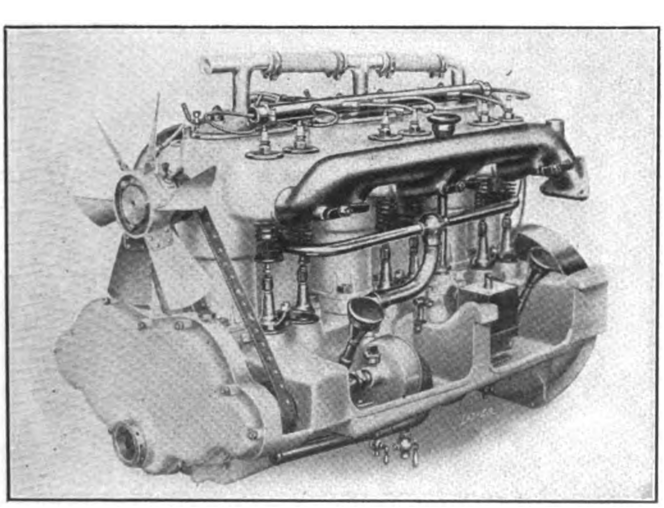
Before attempting to start a car, be sure that you have a supply of gasoline, water and oil. Examine the state of the gasoline supply by taking off the cap of the tank whereever located. The water is looked into by removing the filler cap on the top of the radiator at the extreme front of the car. The screens may be removed with the fingers to look into both the gasoline tank and radiator. The supply of lubricating oil is investigated by examining the lubricator or other device for oiling the mechanism.

After assuring yourself that there is a sufficient supply, proceed as follows: Move the switch on dash to "Bat," which connects the battery. Move the spark lever (the smaller one on top of the steering wheel) to the position of 5 o'clock, and the larger one (which is the gas lever or throttle) to the position of about 4 o'clock. Next go to the side of the car and be sure that the gear shifting lever is in the central or neutral position of the quadrant. Now pass to the front of the car and push in the crank, hooking the starting crank pin into the crank shaft ratchet of the motor. Crank the motor in the direction in which a clock runs, after pulling out the little button which projects through the radiator and holding it out for about three or four seconds to prime the carbureter. Do NOT PUSH DOWN ON THE CRANK, for if the motor kicks back, owing to improper position of the spark lever, you will probably injure your arm. Always LIFT UP ON THE CRANK.

If everything is right, the motor will start with a few lifts of this crank.

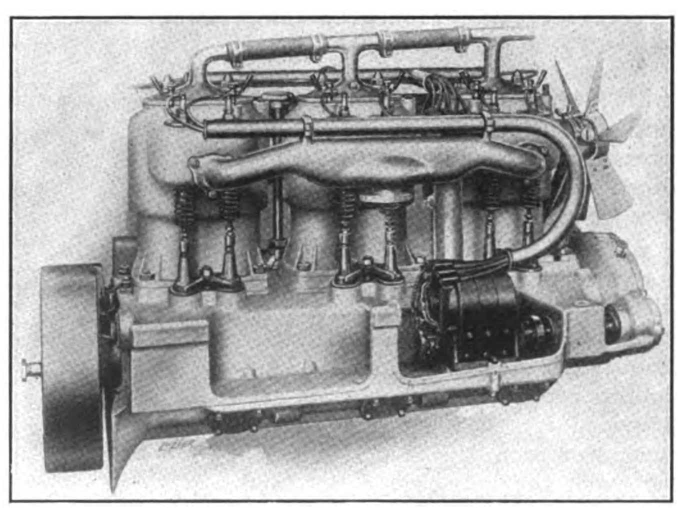
Lubrication

Cylinder and Bearings—Are lubricated from splash by supplying a high grade cylinder oil to the crank



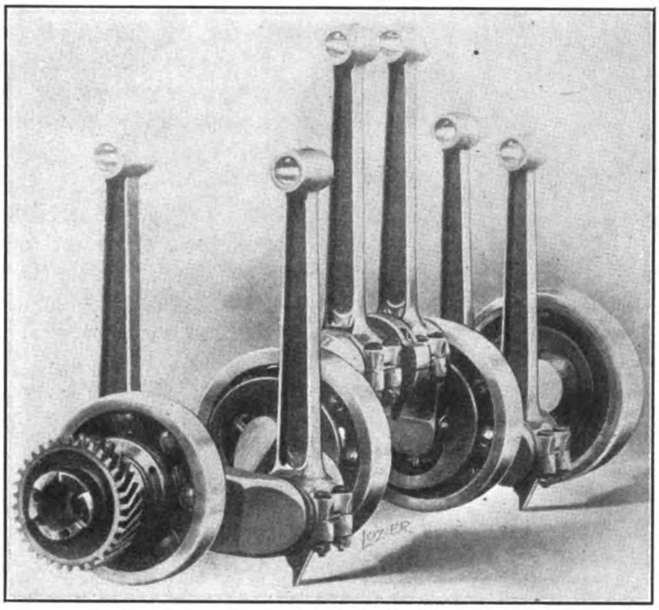
EXHAUST SIDE OF SIX CYLINDER MOTOR

The front case contains the gear train for operating the shaft that drives the fan and water pump on the one side and the magneto on the other side. The pump case is shown with the small pipe leading up into the jackets. The exhaust manifold is the large pipe terminating with a triangular flange.



INLET SIDE OF SIX CYLINDER MOTOR

This shows how the magneto is driven by the right hand member of the gear train. The system of wiring to the spark plugs is also made clear. The manifold shown on this side carries the gasoline vapor from the carburetor (not shown) and distributes it to the explosion chambers of the cylinders.



CRANK SHAFT WITH CONNECTING RODS

Here are shown the ball bearings in which the crank shaft runs and the spiral gear on the end of the shaft. This latter is said to be a new feature.

case. Fill through the breather tube on the right-hand front foot of the motor until the oil flows out of the upper gauge cock at the right-hand rear end of the oil well on the bottom of the crank case. Never allow the oil to get below the lower gauge cock. A small quantity of oil should be added from time to time to keep the level fairly constant. The oil should be drained out and replenished with fresh oil about every two thousand miles.

Motor Gear Case—Is lubricated by grease packed in the case around the gears. This grease should be replenished as often as the oil well in the motor oil pan is filled.

Water Pump—To be lubricated with a good grade of heavy grease, and to be applied through two grease cups located on the pump. Keep cups full and screw down two or three turns daily.

Fan—The fan hub is packed with a good grade of cup grease before the car is shipped. This should be freshened up from time to time by application of a good grade of light lubricating oil through the oil hole provided for that purpose. About once a season the fan should be removed, the hub cleared out, and a new supply of grease provided.

Magneto—To be lubricated with a few drops of light oil applied at the three holes provided for that purpose. Should be oiled about twice a month.

Commutator—To be kept full of good, pure vaseline or cylinder oil. Should be cleaned once or twice during the season.

Transmission—Fill about one-third full of good grade of heavy oil through filler hole in top of case; should be replenished occasionally to keep level fairly constant and should be drained out and filled with fresh oil about every two thousand miles.

Rear Axle—The gear housing to be kept about one third full of a good grade of heavy oil or transmission grease, replenishing same occasionally. Should be drained out and filled with fresh oil about every two thousand miles.

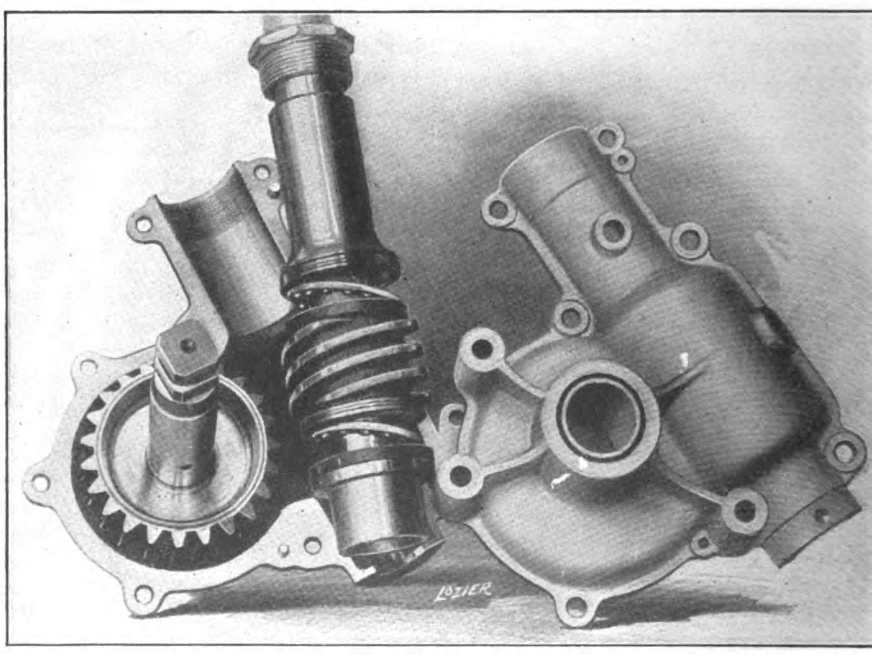
Wheel Hubs—To be packed full of a good grade of cup grease. Should be taken off and bearings cleaned and repacked about once or twice during the season.

Clutch Leather—To be kept soft by occasionally applying neatsfoot oil or castor oil. In case the clutch becomes harsh, lubricate with oil as noted.

Clutch Hub Universal Joint—These joints are both covered by a single leather boot which should be kept packed nearly full of a good grade of heavy grease with a melting point of not less than four hundred degrees F. Clean out and repack once or twice during the season. Special attention must be given to fasten boots securely.

Clutch Release Mechanism—A grease cup of ample size is provided on the right-hand side of the clutch release yoke. This should be kept filled with a good grade of cup grease and screwed down two or three turns daily. Bearings supporting the clutch release rock shaft are provided with oil holes and should receive a few drops of oil occasionally.

Drive Shaft Universal Joint—This joint is located directly back of the transmission and at the front end of the propeller shaft. It is constructed so as to be grease tight and should be filled with a good grade of cup grease. This joint should be thoroughly cleaned and repacked once or twice during the season. After cleaning or lubricating, special attention must be given to insure



THE WORM AND WORM-WHEEL OF A STEERING MECHANISM

When there is any wear discernible in a mechanism of this type it may be remedied by turning the worm-wheel on its shaft so as to present teeth that are less worn to the steering column.

that the case covering this joint is tight.

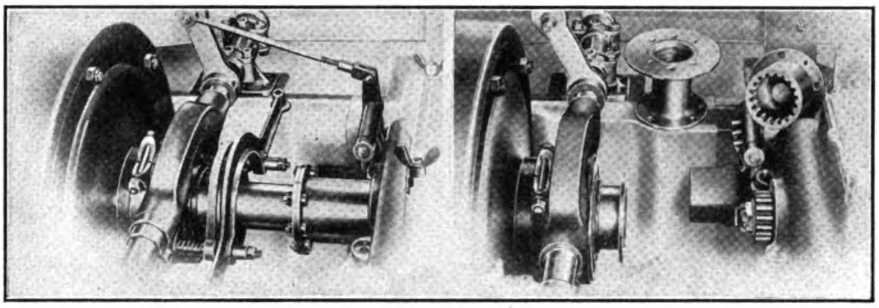
Grease Cups—All grease cups should be filled with a good grade of cup grease and screwed down two or three turns daily.

Steering Gear Case—To be packed full of a good grade, medium weight cup grease and replenished from time to time by means of the grease cup located at the top front side of the steering gear case.

Steering Reach—The ball joints on each end of the steering reach should be washed occasionally with gasoline and then thoroughly lubricated with a good grade of light oil, and packed full of a good grade of cup grease. Attention should be given to these joints as occasion may require.

Small Oil Holes, Rod Ends and Miscellaneous Parts—Every day or so the car should be gone over with a hand oil can and a few drops of a good grade of machine oil applied at the various oil holes provided and on rod ends, pins, etc.

To keep cylinders clear of carbon, it is well to put about a tablespoonful of kerosene into each cylinder by means of priming cock on top, allowing same to remain over night. Upon starting the motor in the morning, black smoke will emit from the muffler for a few minutes, but this will shortly disappear. This should preferably be taken care of about once a week.



THE CLUTCH BRAKE DEVICE ON THE LOZIER CAR

The first view shows the device assembled, while the second view shows the parts disconnected.

THE CAUSES FOR TROUBLE

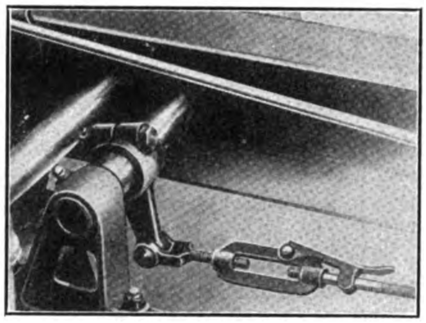
Stopping of Motor

1—Out of gasoline.

2—Disconnected switch or wires.

3—Out of oil. (Indicated by knocking in motor, followed by stop.)

4—When cannot crank motor.



TURNBUCKLE OF SPECIAL DESIGN ON BRAKE ROD

This shows the device for adjusting the rod and then locking the turnbuckle when the proper adjustment is made.

Frozen water pump. Seized bearings through lack of oil. Transmission engaged.

Missing of Motor

1—Bad spark plug. Shift to other system to see if that is working.

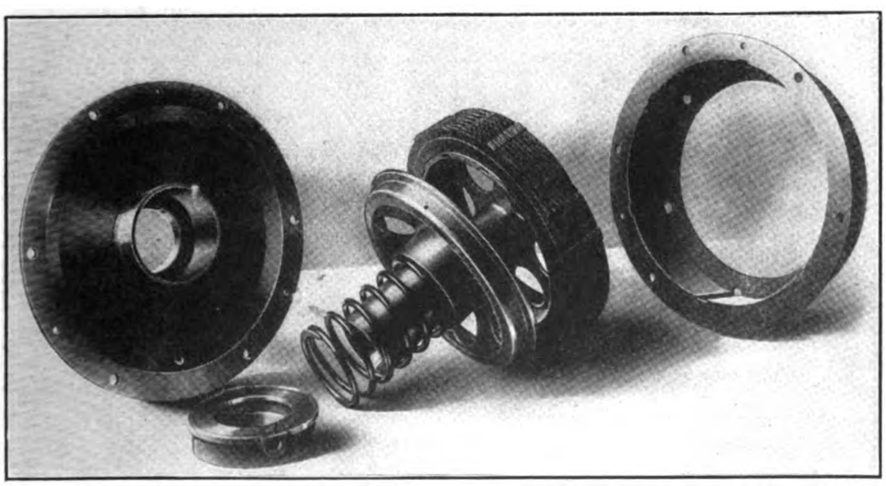
2—Broken or disconnected wire. Shift to battery to see if other system is working.

3—Dirt in carburetor. Motor will probably spit back through carburetor.

4—Loss of compression in any cylinder. Valve may be stuck or there may be dirt under it.

5—Water in the gasoline. Motor runs and then quits, and then runs again in fits and starts. (This is the most difficult to classify, and should probably be the last thing looked for.)

6—If motor misses on battery, also, you may locate the cylinder by holding down the vibrators on the top of the coil box on dash with the fingers and finally locate the one which will not fire. They are numbered 1, 2, 3, 4, from left to right. After changing the spark plug, try again, and if the trouble still is encountered you may look for a valve which is not seating. This will also be detected by cranking, as the motor will turn over easily on this cylinder's compression stroke, as the gas will escape through tho space under the raised valve.



THE MULTIPLE DISC CLUTCH

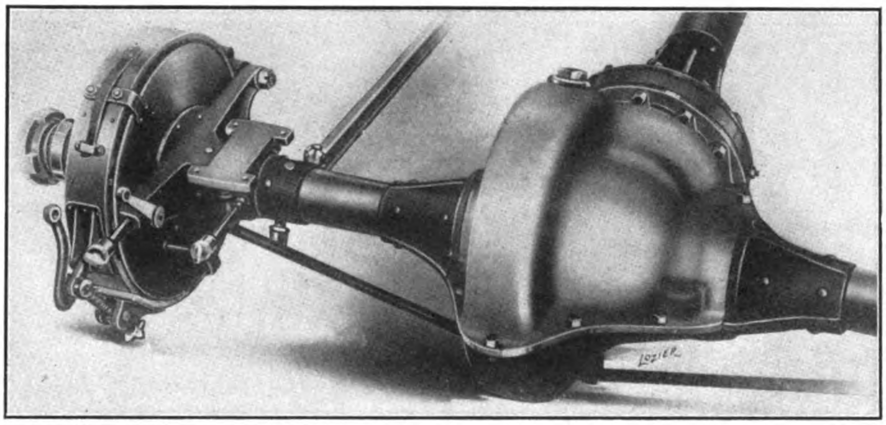
There are several types, but when taking any of them apart care must be exercised when releasing the spring. Severe injury may result when the spring snaps free, unless caution is used and the fingers kept out of harm's way.

Loss of Power

1—The motor will run, but will not pull on grades or under heavy load.

Loss of compression, too rich a mixture through carburetor flooding, weak ignition if on batteries, valves not seating properly and not holding compression, out of water or oil and motor running hot, lack of gasoline. If lack of gasoline through stoppage of pipe, etc., the motor will spit back through the carburetor when throttle is opened.

2—Dragging brakes. See that the car can be rolled by hand easily, or that it will coast down hill with clutch released and not slow down



THE REAR AXLE ASSEMBLY

Here are shown the differential housing and the brake mechanism. The method of operating the braking mechanism is also shown clearly.

too much. Feel the brakes with your hand for heat.

3—Flat tire.

Motor Will Not Start

If you cannot hear the vibrators buzz when cranking slowly, your switch is disconnected or you have a loose ground wire or the batteries are dead.

Don't touch any adjustments or parts until you are sure you know what causes the trouble. You may get everything out of adjustment.

Much loss of time and a great deal of trouble is caused by changing adjustments without knowing what the trouble may be and thereby getting into worse trouble.

When in doubt, don't do anything. Sit down and think it over and analyze the problem.

Motor Will Not Stop

1—Short circuit in switch.

2—Ground wire off the magneto or disconnected from engine.

3—Over-heated. Runs with some pounding and slowly.

Motor Knocks

1—Carbon in cylinders.

2—Too rich mixture.

3—Motor speed too slow when pulling on hill in direct drive.

4—Loose connecting rod bearing. (Light knock at high speed.)

5—Crank shaft bearing loose. (Heavy pound at slow motor speed under heavy load.)

6—Too much play in valve push rod. (Light tapping sound.)

Water Boiling and Steaming

1—Low supply of water.

2—Too rich gasoline mixture.

3—Carbonized cylinders.

4—Lack of oil.

5—Weak ignition (if on battery system).

6—Broken fan belt.

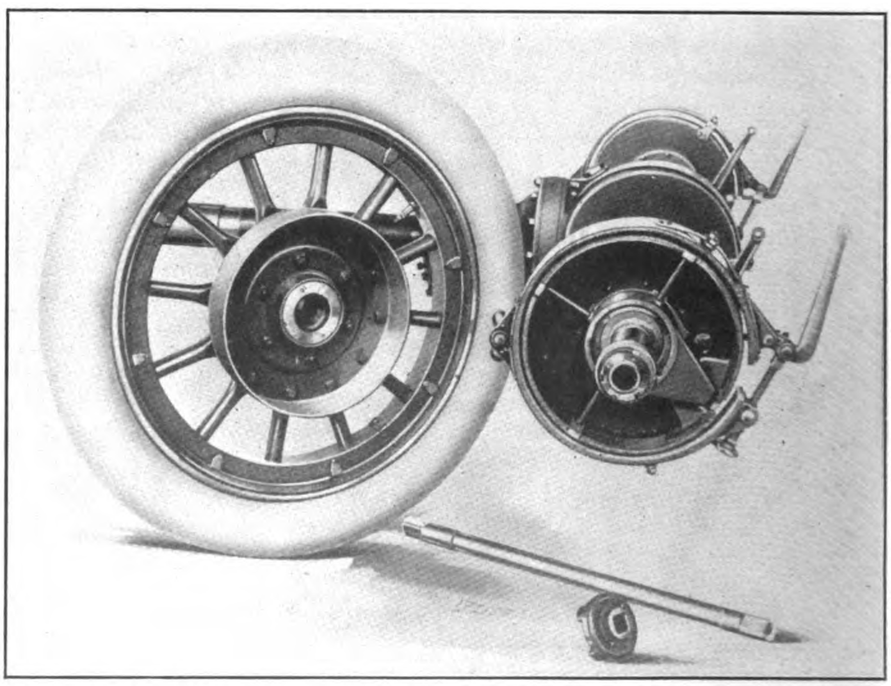
7—Broken or inoperative pump.

Clutch Slipping—If the clutch should slip, which is evidenced by the engine running away from it when the throttle is open, the trouble may be in too much oil on the leather, or it may be that the springs underneath the leather are out entirely too far. These springs are regulated by the little nuts on the back side of the clutch and may be easily seen by taking up the floor board and looking into the clutch. If these nuts are slacked off the bolt they allow the springs to expand.

Clutch Grabbing—If the clutch takes hold too suddenly and is that most motorists call a "fierce clutch," the nuts on the little adjusting springs must be slacked off a turn or so to allow the springs which are under the leather to push their part of the leather out so that it engages before the main part of the clutch and thus will cause a gradual taking hold. The clutch should be lubricated with neatsfoot oil every two or three months, for if the leather gets perfectly dry it will have a tendency to seize too strongly.

Fan Belt—The fan belt should be kept fairly tight at all times. If the fan belt should become loose, it may be taken up by loosening the clamp and raising the fan spindle on the eccentric bushing, then tightening the clamp again.

Unable to Throttle the Motor Down and Irregular Action—If the motor will not run steadily unless it is running at a high rate of speed and you are unable to adjust the carburetor to overcome the difficulty, then you may look for leaks around the joints in the intake manifold and pipes. Take an oil can containing gasoline and squirt the liquid around the joints. If there is a leak there, the motor will die or perceptibly slow down on account of the excessively rich mixture furnished by the oil can through the



ANOTHER VIEW OF THE BRAKE MECHANISM

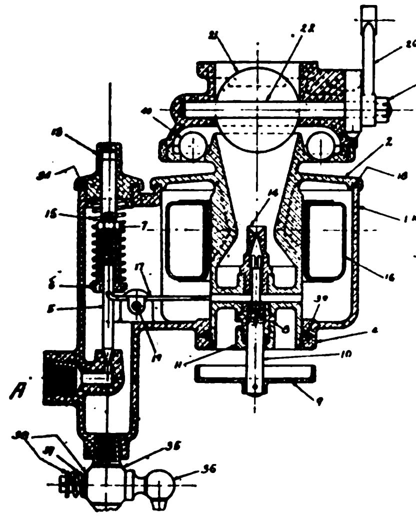
The rear wheel with its brake drum has been removed to show the external and internal brake bands and how they operate.

leak. This should be a last resource, as it is seldom that the trouble will be found here.

Operation and Adjustment of Holley Carburetor

Referring to the sectional cut, gasoline enters float chamber at A and is maintained at the proper level in the spray nozzle 14 by the float 16 acting on the float lever 17. The gasoline spray is adjusted by the needle 10, controlled by the knurled button or gear 9. The throttle for governing the amount of mixture and speed of motor is shown at 24, controlled by the throttle lever 20. The auxiliary air enters at the series of holes covered by the balls 40, and requires no adjusting.

Adjustment is as follows: Close throttle about ¾ and with needle



ADJUSTING THE HOLLEY CARBURETOR

valve 9 about ¾ of turn open start motor, then gradually close throttle until motor runs at the required low speed. The gasoline in the meantime being adjusted at the best running point for this speed. The stop on throttle lever should then be adjusted so as to allow motor to run slow without choking when throttle is suddenly closed. The adjustment of this stop in relation to the slow speed adjustment of needle valve should be such that an extreme closing of throttle for low speed should not be necessary to obtain low speed. This will allow motor to accelerate rapidly and prevent mixture from becoming too lean at higher speeds.

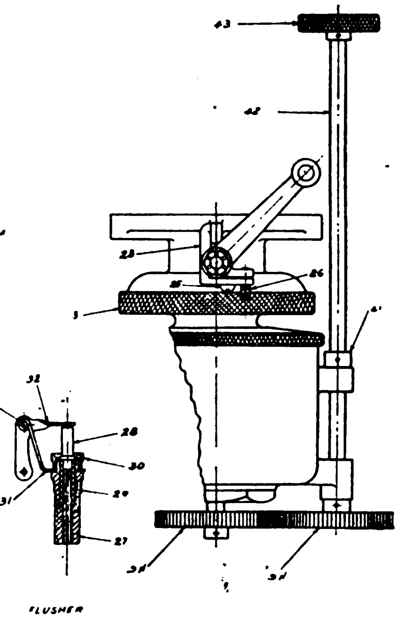
The adjustment nut 7 on the float needle 5 provides an adjustment for the fuel level in the spray nozzle 14, which level should be as shown by the line 7.

To raise level, loosen nut 7 and screw weight 6 toward point of needle. To lower level, reverse operation. One turn on weight 6 changes level about $\frac{3}{32}$ inch. Water and sediment should be drained by cock 35.

The Operation and Repair of Self-Starters—I

HAROLD WHITING SLAUSON

While many of the leading motor car manufacturers still depend on the always-certain-and-reliable hand crank method of starting, a large number of the 1912 automobiles



are provided with self-starters as regular equipment. The public demand for a self-starting motor has been met this year as never before and it seems almost a safe prediction that in a few seasons the hand crank will be more of a curiosity than a necessity and the car that starts at the push of a button will be the rule rather than the exception.

Because it is only on the new cars that self-starters have been supplied to any great extent, such modern equipment is but little known in the average repair shop where the 1912 cars have, of course, not yet begun to make their appearance for their annual overhauling. In a few months from the present, however, conditions will be different, and many a repair man will find himself "up against" a motor provided with a self-starter which, even though in good condition itself, may need to be removed in order to enable the portion of the engine requiring repair to be reached. Consequently every smith or machinist who carries on an automobile repair business should familiarize himself with the "internal workin's" of the four principal forms of self-starters.

Probably the oldest form of self-starter, and one which is used on a large number of the new cars, is the compressed air type. In this type, air is stored in a tank attached to the frame of the car and is admitted to the cylinders of the motor when it is desired to start the latter. The pressure necessary to be stored in this tank will vary from 50 to 150 pounds per square inch, and is obtained either directly or indirectly from the motor itself. In the first instance, a spring-operated check valve is set in the head of one or more of the cylinders and connected with the air storage tank. At each explosion a part of the burned gases is forced through the check valve and gradually fills the tank until the desired pressure is reached. The check valve, of course, prevents the escape of the pressure back into the cylinder. Although this is the simplest system for obtaining pressure in the storage tank, the gases that are thus taken from the cylinder consist of carbon-dioxide and water, a combination which has a highly corrosive effect on steel. For this reason the storage tank must be especially lined, and as such a gas will also cause rubber to deteriorate rapidly the pressure from this system cannot be used for pumping the tires of the car.

This last objection is overcome by the use of a small differential pump set in the cylinder head and connected to the storage tank in the same manner as was the check valve. This differential pump consists of a double cylinder, one smaller than the other. The device is screwed into the gas engine cylinder head so that the piston operating in the large barrel (or cylinder) obtains its pressure directly from the motor cylinder. The small barrel is connected with the outside air, and its piston, being attached to the other end of the same rod,

A COMPRESSED AIR SELF-STARTER

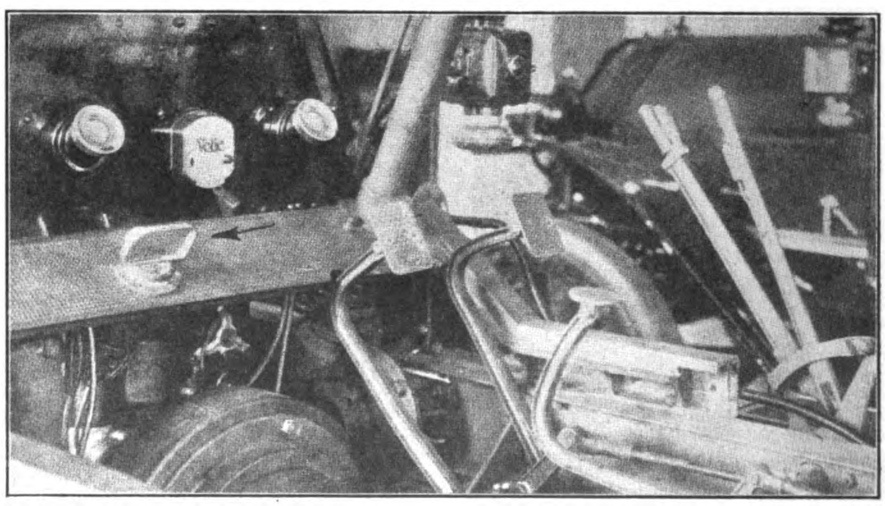
The Widner type which works on the principle of compressing air with a pair of separate cylinders. The button on the toe-board releases the air.

operates in conjunction with the large cylinder. Thus, with each explosion in the engine cylinder, the larger piston is forced up and pumps a smaller quantity of pure air into the storage tank by means of the operation of the piston in the small barrel. On account of the difference in the size of the two cylinders and pistons of the device, a "differential action" is obtained that enables the smaller piston to pump higher pressures than those in the gas engine applied to the larger piston. When the pressure in the tank reaches a certain amount, the differential piston will be forced down automatically and the pumping action will cease until the pressure is again reduced. The simplicity of the single moving part in this pump, its absolutely automatic action, and the quietness with which it can be operated when properly designed, make this one of the most suitable and satisfactory forms of air compressors. This pump, however, will only pump its highest pressures when the pressures in the engine cylinder are the greatest, and this is a condition that will only prevail when the motor is operated at its full power. Thus, it may be with many starts and stops in city traffic and with the motor throttled continually, that no opportunity will be afforded to pump the tank to its required pressure; and it is to overcome such objections that the motor-driven air compressor is used on some systems.

Such an air compressor consists of the conventional cylinder, piston, connecting rod and crank shaft, this last being attached to a gear and driven by the gasoline motor. Inasmuch as the air is heated to rather a high degree when it is compressed, the pump is often cooled by means of flanges resembling those of an air-cooled gasoline motor. The gear on the crank shaft of the compressor may mesh with one of those of the forward train of the gasoline motor. Although some of the compressors are permanently geared and are driven whenever the motor is in operation, the majority are provided with some means of disconnecting the pump from its driving pinion when the pressure in the tank has reached the required amount. This may be done by means of a sliding gear or a clutch on the shaft, either of which are, as a rule, operated from the seat by the driver. If the pump is permanently geared to the motor, an automatic release must be provided which will allow the air to escape when the pressure in the tank has reached its proper amount.

The valve for admitting the air from the tank to the various cylinders of the motor is located on the dash board of the car within easy reach of the driver, and it requires but the turn of the handle to start the motor when the conditions are correct. It will be understood that the air under pressure is led to the various cylinders and forces the pistons down in the same manner as does steam in the steam engine. But the air must be admitted to a certain cylinder *only* when its piston is about to start on its power stroke; for on the other strokes either the valves are opened, which would allow the escape of the air, or the piston is moving upward, in which case the application of the pressure would create a counter-force that would tend to stop the motor. Consequently it is absolutely necessary that all air starters should be provided with some device for distributing the pressure to the proper cylinder at the proper time. Such a device is called the distributor, or selector, and generally consists of a disc having an opening, or port, connected by means of a pipe with each cylinder of the motor. Thus, there is a port and pipe for each cylinder. Lying over this first disc is another having a single port and connected with the main supply pipe of the pressure system. The two discs are enclosed in an airtight casing.

If the master disc, or the one having the single port, is revolved, connections will be made with the different cylinders as its opening passes over those in the other disc, thus furnishing passages for the introduction of the air to the proper cylinders. It is evident that in order to admit the air at the proper time, the master disc must be set to hold a certain relation with the ports of the other disc and that it must revolve at a speed that will vary with that of the engine. Consequently the distributer is generally geared either to the timer shaft, the cam shaft or any other shaft having a speed of one half that of the motor crank shaft. In other words, the distributer is in reality a rotary valve that controls the



A SELF-STARTER OF THE GAS TYPE

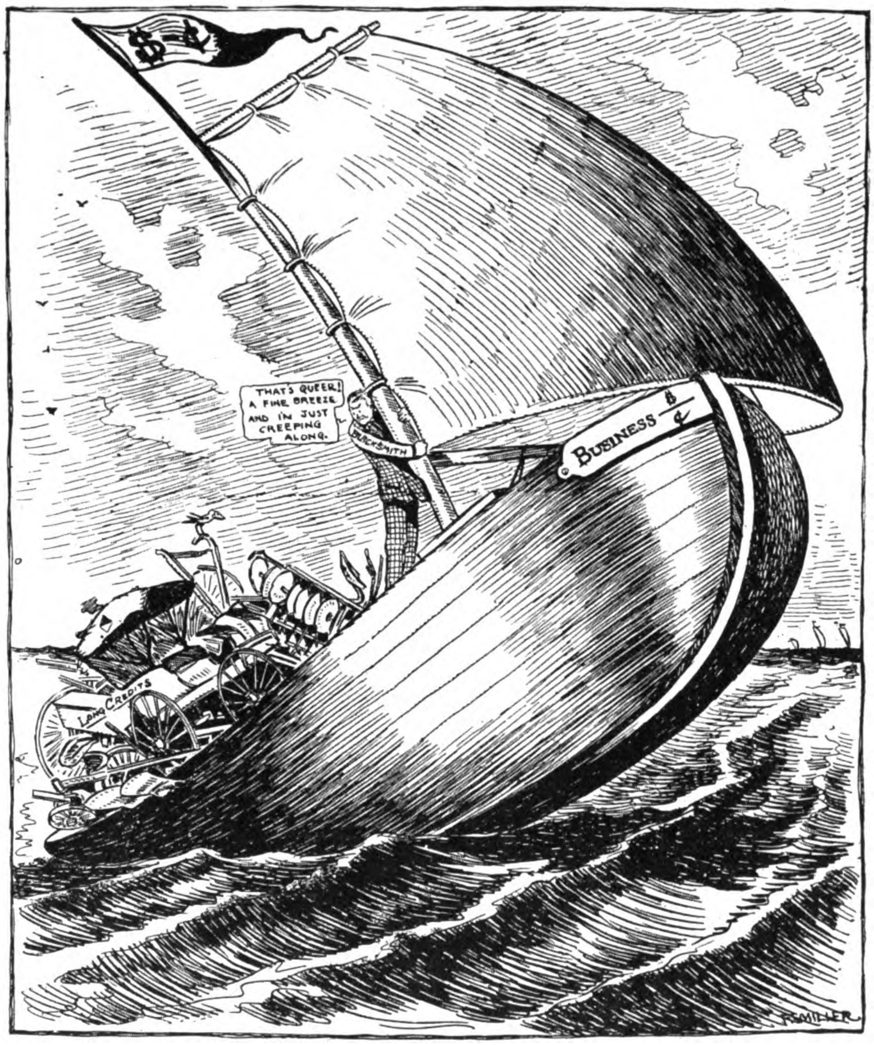
The tank is on the right side below the frame—the starting handle is on the toe-board, as indicated by the arrow.

admission of the compressed air to the cylinders, and consequently its frequency of operation must be the same as is that of the intake or exhaust valve of a four-cycle motor. In order that the revolving disc of the distributer shall always bear the proper relation to the position of the pistons, it is generally permanently geared to one of the shafts of the motor and moves whenever the motor is in operation. Some types have been in use in which the master disc was thrown out of mesh except when it was to be used for starting, but such a design necessitated the use of a "finding" device by means of which the two portions of the distributer would immediately resume their proper position with relation to each other. This complicated the construction somewhat, and the majority of air starters in use today employ the type of distributor that is in operation whenever the engine runs.

In order to reduce the wear on a distributer that is running constantly, several ingenious devices are used which serve to lift the master disc off of the other when the starter is not in use. In some of these a centrifugal governor is used, the pressure of the air from the tank being relied upon to force the master disc back to its seat when the starter is to be brought into play. A disc which is worn excessively will not confine the air to a single port at a time, but will allow it to escape to the other cylinders, thus greatly reducing the efficiency of the starter.

If the pipes are to be disconnected from the distributer, care should be taken to designate each one so that each may be returned to its proper place. The "timing" of the distributer is equally important, and while there will probably be no necessity for readjustment in this direction if the driving gear is not removed or the discs withdrawn from their shafts, the replacement of any of these parts or the overhauling of the motor will interfere with the proper setting. If the distributer is to be removed with its gear, a tooth on the latter together with the two teeth between which it meshes on its neighboring gear should be marked with a prick punch and the greatest of care taken to replace these in the same relative position. If a new gear or disc is to be put in place, so that the registering marks cannot be made on the adjoining parts, the timing must be made by measurement or trial.

In this event, it is well to remember that the distributer should only make connection with a cylinder when both the valves of that cylinder are closed. Furthermore, inasmuch as the compressed air is to be used to run the motor until it begins to operate under its own impulses, the air pressure must not several degrees before the bottom of the stroke, the time during which the air can be admitted is comparatively short and necessitates the use of rather high pressures in the tank. If it is remembered that the air will be admitted to a certain cylinder as soon as the master disc *begins* to uncover the port connected with that cylinder, and that it will not be cut off until this opening is entirely closed, the proper setting of the distributer should not be a difficult matter.



With Apologies to Weekly Imp. Tr. Journal

TOO MUCH BALLAST

interfere with the ignition of any charge that is drawn into the cylinder—or the engine never *would* run of its own accord. Consequently, the only time during which the compressed air should be admitted to a cylinder is between the occurrence of the spark at the top of the stroke and the opening of the exhaust valve. In fact, the air should not be admitted until a perceptible time after the spark has occurred. Inasmuch as the exhaust valve opens

Owing to the high pressures used in the air starters, great care must be given to the joints and pipe connections. Leakage is liable to occur in these, and this may be found to form the chief trouble with an air starter. Some systems are provided with a shut-off valve located near the tank which serves to relieve the majority of the pipes and connections from the pressure, but this is only to be used when the car is to remain idle for a number of

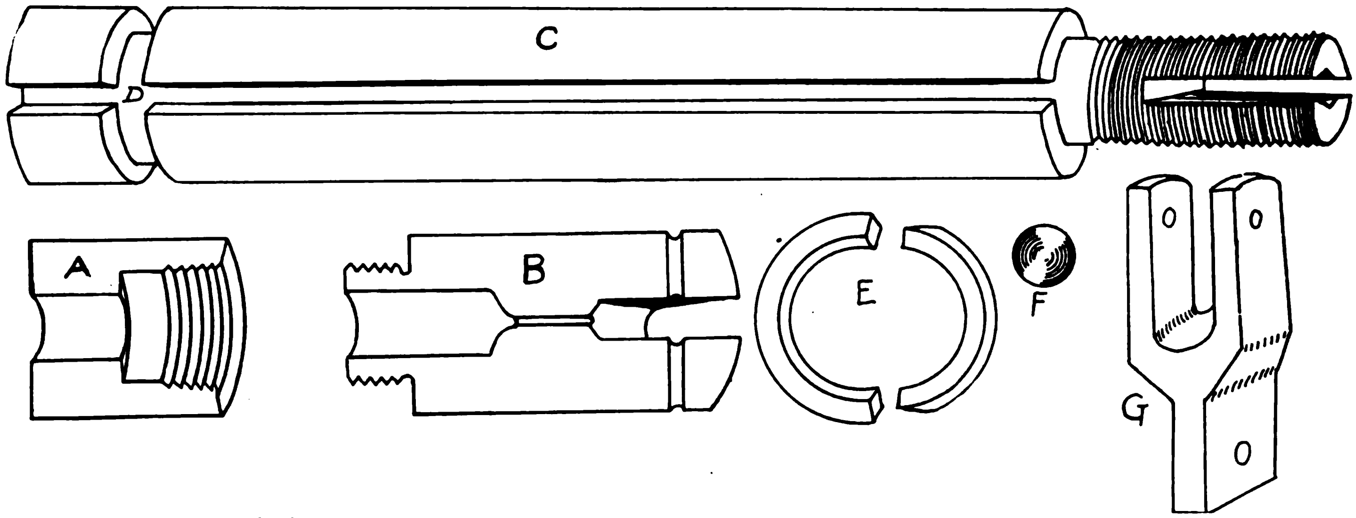


FIG. 1—SHOWING DETAILS AND PARTS OF THE SHOP-MADE BORING MACHINE

days, and will not cure the ills attendant upon leaky joints. If any part of the pressure line is disconnected, it should be tested for leaks with soapy water after replacement.

Although an air starter will perform its work in the large majority of cases, it cannot start a four-cylinder motor that has stopped with its working piston on dead center. Consequently, if an air starter fails to work at one trial, the repair man should not assume that the trouble lies in the distributer, pump, or connections until he makes certain that the motor has not stopped on dead center. By distributing the air to two cylinders at a time on a six-cylinder motor, the engine may be started regardless of the position of its pistons.

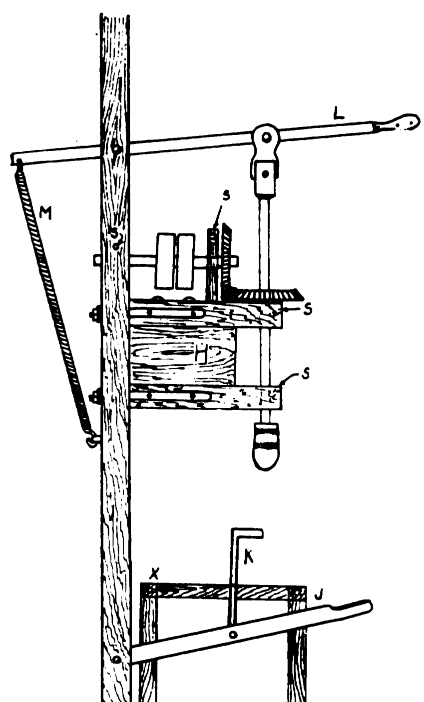


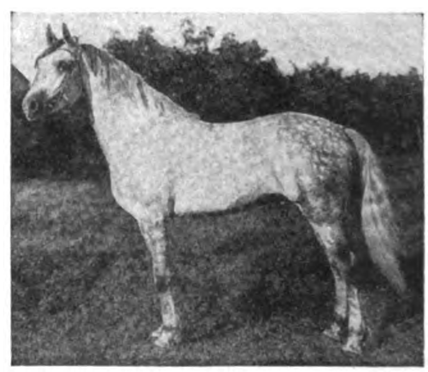
FIG. 2—SHOWING THE COMPLETE MACHINE

Shop-Made Machines, Generally, and a Boring Machine, Particularly

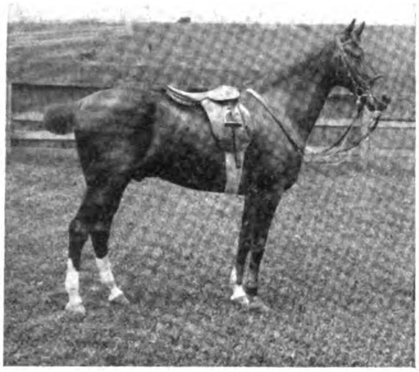
W. E. Etter

I am very much interested in machine and automobile work and also home-made tools and machines, but I notice some brothers object to home-made tools and machines. I think some machines are too complicated for the smith to make and that he can better afford to buy than to build. Suppose, however, one wanted a circular sawing machine or a boring machine, and he has a lathe—I think he can build them cheaper than he can buy. Of course he would have to buy the saw blade, but he has the auger bits. It is not as big a job as some may think, for you can get a good twenty-inch saw blade for $4.00, and you can build the frame of good, seasoned hardwood. Use an old mower or binder part for a shaft, turning it true, placing the collars and threading it with a nut to fit. Get some boxes off the old machine or have them made cheaply, or the boxes can be made of wood and babbitted. I have a saw machine I built three years ago which is still in good condition and which has been worth a great deal more to me than its cost.

I also built a boring machine which does good work and is in good shape. The part I like about it is the chuck which is the chuck of a breast drill. It takes square shank auger bits, the same bits that the bit brace takes, keeping the bit to the center of the spindle. You don't have to use a wrench to put the bits in or take them out. I will try to illustrate the boring machine. In Fig. 1, A and B represent the swivel that fits over the head of the spindle C. The parts are split to show the inside. To assemble, put A on the spindle C, letting it down below the groove D, then put the open washer E, in groove D and slip A up till the washer is to the bottom of the enlarged part of A. Then place the steel ball F on top of the spindle and in the center hole that was used to hold it in the lathe. Now put B on and screw them together. The counter-sink in B is for the top of the ball to fit in; it also has a small oil hole. The fork or link G fits in the top part of B and the forked end is for the lever to work in. Fig. 2 shows the machine. H is wood-bolted together and bolted to the 4 x 4 post with strap bolts. The spindle and counter-shaft holes are



A STALLION OF THE ORLOFF BREED



A PERFECT TYPE OF SADDLE HORSE

bored in the wood one half inch larger than the spindle and shaft and babbitted. The tight and loose pulleys are made of wood. The bench X is 18 inches wide and 6 feet long. The foot lever J has a hook K to put over the timber to keep it from rising with the bit when raising it out of the work. The hand-lever L is made of buggy tire steel and has a wood handle. The oil holes are shown at S. S. S. S. A coil spring M is to raise the spindle.

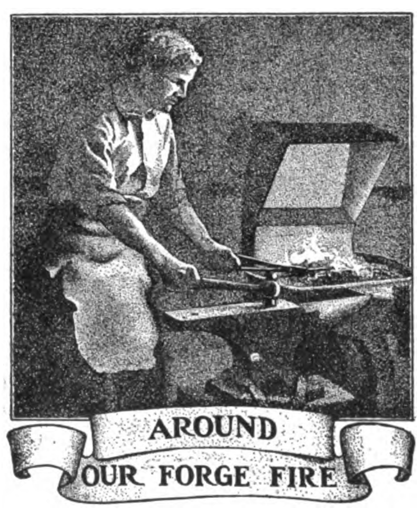
Tire Setting—Self-Adjusting Tongs—Horseshoer's Examinations

W. H. Chambers

I am very much interested in the arguments on tire setting and horseshoeing. Our reasoning together about the better way to do a piece of work should be above personal abuse. There should be more heart-to-heart talks. If we know anything beneficial to our brethren it should be given freely and fully. Most of the arguments on both sides of tire setting are wrong, unless the boys get a better lot of wheels to set than I do. I never get over one or two sets during the season that do not require the spokes to be wedged. There is only one class of wheels that I would want a cold tire setter for, and that is the wheel where the spokes are loose in the hub and the customer does not want to pay for the proper repair. Then you could pull it down without guessing. I would rather spend the money necessary to purchase a cold tire setter in a trip hammer and punch and shearing machine. I have a D. H. Potts hot shrinker, weighing 1250 pounds, which certainly gives satisfaction.

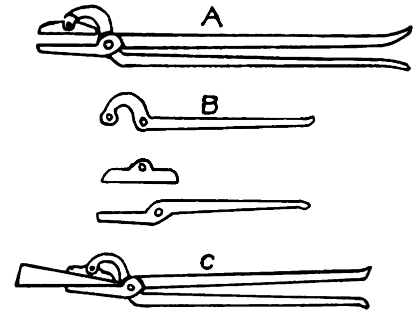
Here is an engraving of my self-adjusting tongs or parallel tongs as they were termed in the January number. Just three pieces: One half is just a straight lip, the other a goose neck for block. In making them, allow the block to be just enough heavier on the back end for it not to drop down and hinder taking the iron. These tongs will hold any thickness of iron from ¼ to ¾ inches thick and will hold beveled stock as shown at C. I use these in putting a landside on a plow share and they work well. I catch the nose of the share instead of the back of the landside and weld back end first without any trouble at all. I prefer this style to the usual style for this purpose.

I hope that I may see the day when a law is passed that every horseshoer has to pass a rigid examination before he can start a shop. I believe every one thus examined should be given a horse to shoe, point out the defects in the horse and tell why he shod him the way he did, and prove his logic, etc. I believe more than half of the shops running today would close, and the smiths who do know how to do the business would then be able to get good prices for their work.



"Say, Mr. Editor, do shoeing methods in other countries differ very much from the practices generally observed here?" questioned Benton, as he settled back in his chair and watched the smoke from his newly-lighted cigar.

"No, and yes," replied the Editor. Then explaining, "There is little or no difference in the methods used in the larger cities of the world, but in the rural districts of



A PAIR OF SELF-ADJUSTING TONGS

some countries methods differ considerably. Then, too, there is a difference not only in the methods of shoeing, but in the methods of pursuing the business. For example, instead of taking a horse to the shop to be shod, in Moscow, Russia, the horse-owner sends for the shoer. This man then measures the horse's feet, gives the measurements to a shoemaker, and after getting the shoes from the latter the shoer again visits the owner's stable and applies the shoes."

"These men are specialists, then?" questioned Benton.

"Yes, the man who makes the shoes specializes in that work. He does nothing else. He is highly skilled in turning shoes exactly to the measurements furnished by the shoer. The shoes are generally made of one piece of steel, including the calks which are never welded on, but are drawn out. They also make some use of screw calks."

"Well, according to that system the shoemaker never sees the horse for which he makes shoes," returned Benton.

"He never sees the animal for the purpose of fitting shoes to his feet," continued the Editor. "The measurements made by the shoer are preserved and filed for future reference, together with perhaps a set or two of shoes for the animal named in the memorandum. Then, when the shoer receives a call for a set of shoes for the horse of one of his clients, he calls at the shop, secures the proper shoes and goes to the stable of the horseowner where he attaches the shoes to the horse's feet."

"The actual shoer, then, has no shop. Is that right?"

"The shoer has no shop, but makes his headquarters at one or the other of the shoe manufacturing shops." explained the Editor. "He travels about the city, probably visiting one patron after another, carrying his kit of tools with him and attending to the trimming of the horse's feet, measuring for shoes and applying them right in the stable. And, when he nails the shoe on the foot, instead of twisting off the end of the nail he bends it over, pounds it down and then files it off."

"The shoemaking shop, then, is not of necessity very large, I take it," said the Recipeman.

"No, the shop need not be very large and it isn't," agreed the Editor. "No space is needed for horses. All the shopman needs is space for an anvil and a forge, with perhaps wall space to hang up some made-up shoes with their memorandum paddles—the dimensions of shoes for each horse are kept on a piece of wood or stick."

"Well, that is interesting," said Benton. "And I suppose there are lots of just such items about conditions and methods in other countries."

"Yes, there is something along that line to be told regarding many countries, but we'll have to leave them for some other time." And the Editor turned to give his attention to some new proofs from the printery.

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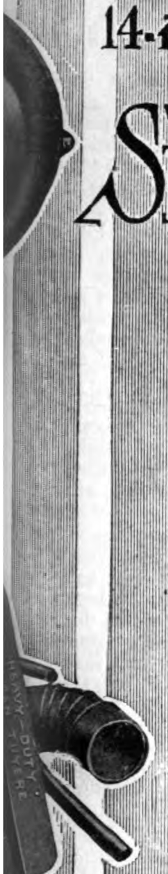
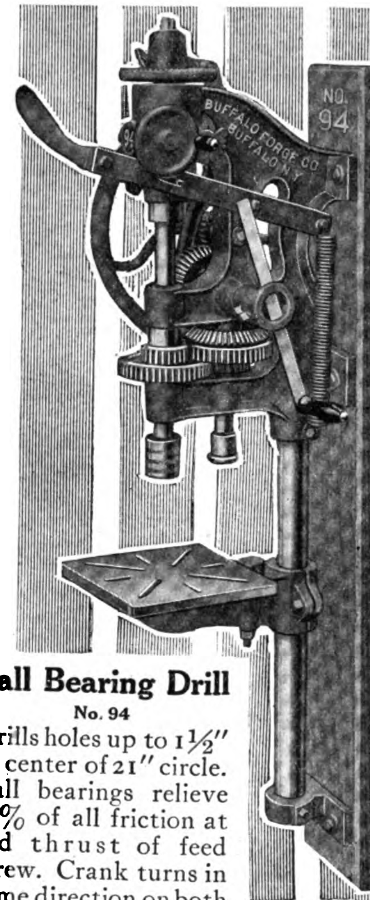
Blacksmith Machines



14-inch Fan Silent Blower

Our patented Down Draft Forges are, indeed, recognized as so superior to brick and other forges that they are regularly specified by the Governments of U. S., Canada, Belgium, France, Italy, Brazil, etc., etc. To our line of power blowers and forges must be added our power Punches and Shears, Drills, and the Crain Combination Woodworker. We make and sell more power equipment than all other manufacturers of blacksmith tools put together. The largest concerns in the country consult us freely on the subject of laying out and equipping a modern forge shop. There probably is not another organization in the world which is better qualified to give such advice than the Buffalo Forge Company.

We offer our service free to all readers of The American Blacksmith who are interested in installing power equipment of any kind. You will be under no obligation whatever to purchase. So write us now.

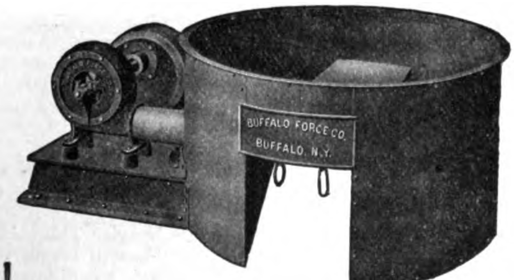


Ball Bearing Drill
No. 94

Drills holes up to $1\frac{1}{2}''$ to center of $21''$ circle. Ball bearings relieve 90% of all friction at end thrust of feed screw. Crank turns in same direction on both speeds; change of speed obtained by sliding collar. "Sure-grip" chuck—no threads, no set screw. Fasten or loosen bit by twist of hand. Complete description No. 119-A, sent on request.

Buffalo Forge Company

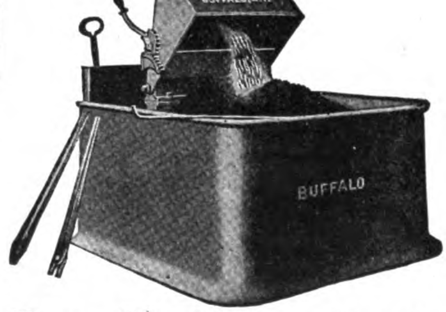
Buffalo, N. Y.



Woodworker
One
Planer, Lathe,

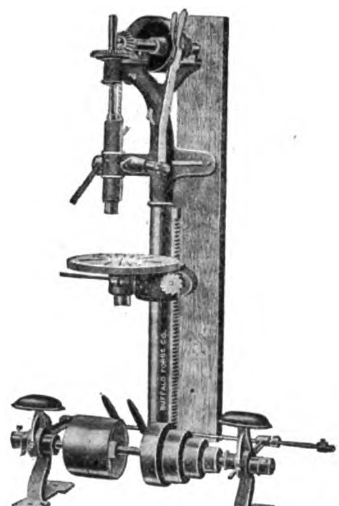
Special Forge with Individual Blower

Such a forge can be easily installed and is very desirable where an extra forge of very large capacity is needed. The blower is shown direct-connected to a motor, but can also be pulley-driven.



Down Draft Forge No. 00

Our most popular design. A series of these forges with blast supplied from one single power blower is a very common installation in large shops.



Power Drill No. 87

Ol' Sal

W. O. B.

Thar ain't no use t' hem an' hum
B'cus Ol' Sal y'r time hes cum.
Y'r gittin' old—thar ain't no need—
O' keepin' a hoss thet can't earn feed.
An' es I've allus sed before
I'd never sell y' sound or sore,
So jes' cum 'long right arter me
An' I'll put y' out o' y'r misery.

Been thinkin' it over—'tain't no fun—
Fer sum time back—but's got t' be dun.
Y'r gittin' old—y'r in the way,
Y'r eatin' us out o' oats an' hay.
I got a notion y' kno' too,
What sort o' job we're goin' t'do.
Er why would y' hang back that air way—
Ain't es spry es y' once was, eh!

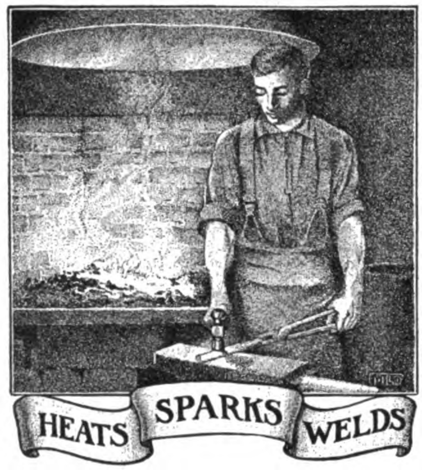
Y'er not es chipper, be y' now,
Es when Young Ted fell in the mow?
When y' went like mad t' Petertown
An' bro't ol' Doctor Pepper down.
'Twas a record race the ol' Doc' sed—
Ef y' hadn't won the boy'd been ded.
Y'r speed them days was known aroun'
The country, village an' the town.

Ain't es frisky es y'uster be,
The time y' carried maw an' me
Thro' Deemer's woods when they caught fire—
I'll tell y' them days y' was spryer.
An' how maw cried an' carried on—
She seen yer hide—y'r fine coat gon'
Y'r flowin' mane an' tail jes' stubs—
Y'r hair all burnt—y'r fetlocks nubs.

So foller 'long right arter me—
We'll do this job at the big ellum tree
'Twill be a marker fer yer hide
An' show the place where Ol' Sal died.
Now steady thar ol' gal—stan' still—
Hope they don't see from the mill.
Steady now gal—jes' a minnit—
Then a grave an' y'll be in it.

Thar, thar, ol' gal—quit nosin' my han'
I ain't got no apple—understan'.
Why somethin's wrong with this here gun.
Can't make it shoot—what's t' be done?
An' I'm es shaky es I kin be
Must be the ague's the matter with me.
An' oh! my back—that's achin', too,
B'lieve I'm gittin' ol' same es you.

What's thet y'r hearin' now ol' gal?
A prickin' y'r ears—the same Ol' Sal—
Whistle a blowin'—bell ringin', too,
Why the dinner bell's ringin' fer me an' YOU.



Time General Blacksmith was prepared for the spring campaign.

If "half a loaf is better than none" is half a loafer better than one?

Wonder if a self-starter wouldn't be a good attachment on a balky horse?

Doesn't it seem as though the smith, of all men, should be able to keep his temper?

We have machines for cutting iron, and they cut expenses, too.

A man isn't necessarily insane if he's a buggy smith.

A Pennsylvania smith recently changed his forging operations to checks instead of iron.

Some folks seem to think that "plucking" and not "pluck" is the secret of success.

Most of the things that "can't be done" are done by the fellow who didn't know they couldn't be done.

While a horse in the smith shop should stand reasonably still, the smith in the smith shop should be on the jump.

There are not near enough people in the world qualifying for the hereafter on the quality basis.

Hans Dillburger says, "Sum dings suckseed like faleyour, unt nodding fales like sucksess." And he's not far from wrong, either.

The "long lost art" of welding copper has again been discovered. An Ohio smith is the lucky man this time. Who's next?

If you know how to file a horse's teeth correctly, let your customers know it. But don't try your hand at it unless you know how.

If you think you need a spring tonic, take one good sharp saw to one good pile of wood and shake thoroughly—best tonic y'ever SAW.

When tempted to the use of many words, remember that an envelope tells simply what it means and it gets there in the shortest possible time.

Yes, and ten years from now the same folks will be saying, "If I had only had a start ten years ago." Now is the time to get your start.

It's right to let your customers know you are in business for money, but don't let them get the idea that you are out for the money under pirate rules.

What do you think the smith shop of ten years from now will look like? Changes will take place, some of them are taking place now. What do **you** think the result will be?

We learn of two more woman blacksmiths—one in Michigan, Mrs. John W. Harris, the other in New York, Mrs. Louis Albrecht. Both work with their husbands in the shop and both love the work.

The way to build business is to go out and get it. Some will come of its own accord, some will come by coaxing, but it will surprise you what a lot of it will come when you go out and get it. Just try it.

"Be they really runnin' drills by 'lectricity?" questioned Tom the other day. Of course we explained that "they really were," but we couldn't help thinking that our Friend Tardy was somewhat behind the times and simply because he didn't read a craft paper.

The inventor of the fifth wheel, Peter Blaire Cunningham, died recently at the age of 77. He also invented the steering knuckle as used on automobiles. Contrary to the usual order of things along the line of invention Mr. Cunningham realized a fortune from the fifth wheel and the improvements he made on it.

Thirty-three years of active service in the blacksmith shop of the Pennsylvania Railroad—that's the record of Samuel Gaff of Altoona. And now the railroad has placed him on the retired list after 33 years of faithful work.

When you catch yourself saying, "I haven't time," just remember that you'll never have any more time than you have right now. We have and we have always had all the time there is—twenty-four golden hours every day. It's not so much a question of time—it's the use we make of it. Let your thoughts dwell on that subject for a while.

A new tire for automobiles is built up of a fabric composed in part of ground leather, rubber and wood fiber, the exact ingredients being carefully guarded. The leather scraps are pulverized by a special process into a powder, soft and fine as flour, and then combined with a rubber base. The process used is extremely dangerous and it is believed that the laws covering the making of gun-powder will be applied to the manufacture of this tire. It is said that the tire has after two years of testing to be more resilient and to wear longer with a much lower first cost than the ordinary rubber casing.

A big, powerful man came into the office one day, carrying a full-sized iron horse collar, says the SCIENTIFIC AMERICAN.

"I am a blacksmith from Canada," he said. "I hammered this out on the anvil. It is going to be used instead of ordinary leather collars."

It weighed forty pounds.

"How is a horse to carry this load around his neck and draw a heavy load as well?" he was asked.

"This is a little heavier than it need be," he explained. "It will be all right."

An effort was made to dissuade him from wasting money on a horse collar that weighed forty pounds, but he was sure of his ground.

Six months later the Canadian returned with another collar, an improvement on the original and which weighed but fifteen pounds.

Three times the man came back. Each time he brought with him a new metal collar, lighter and better than its predecessor.

Now almost every fire-engine horse and omnibus horse in this country and in Europe wears what is known as the stamped-up metal collar. From forty pounds the Canadian had reduced its weight to almost as many ounces. He has given up blacksmithing and lives in great luxury in London.

Our Honor Roll

Walton Kansas
Mar 4 1912

The American Blacksmith Co
Buffalo N.Y.

Gentlemen —

you will find enclosed check for the required Eight Dollars to advance my subscription to Dec 1930

If you can send to me the July number of 1906 it will complete my file of the A.B. from the very beginning
Then you may expect me to pull a long smile

I am Yours Truly
W.C. Watt
Walton Kansas

Another New Leader

The above is an exact reproduction (somewhat reduced) of Mr. Watt's letter—and he is now leader on Our Honor Roll. Who is next?

We have rearranged this list so as to accommodate more names. This month we include all subscribers who are paid up to and beyond January, 1915. Better look over the long-time rates and get on this list now while it is easy to get a place.

NAME	Subscription Paid to
W. C. Watt, Kan.	Dec., 1930
I. J. Stites, N. J.	Jan., 1928
W. R. Turner, Man.	Oct., 1923
W. Lawson, N. Z.	Nov., 1922
A. Pfeiffer, Ohio	Aug., 1922
D. W. Smith, R. I.	Mar., 1922
R. H. Keith, Ia.	Jan., 1922
O. M. Johnson, Minn.	Oct., 1921
H. Feldus, Neb.	Sept., 1921
W. K. Kline, Kan.	May, 1921
R. S. Crisler, Ky.	Jan., 1920
I. M. Townsend, Cal.	Apr., 1919
C. Williams, W. Aus.	Mar., 1919
T. P. Considine, Mass.	Dec., 1918
Richard Brenner, Tex.	Feb., 1918
W. F. Hill, N. C.	Feb., 1918
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, N. Dak.	Nov., 1917
H. Ferrel, Ill.	Aug., 1917
W. McCoy, Kan.	May, 1917
E. Thibaudeau, Wis.	April, 1917
J. N. Miles, Ky.	April, 1917
J. M. Brown, Texas	April, 1917
Ed. Deitrich, Ind.	Mar., 1917
Lewis Chase, N. Y.	Mar., 1917
E. O. Lee, S. Dak.	Mar., 1917
S. Stemple, Ohio	Mar., 1917
R. S. Gugisberg, Kan.	Mar., 1917
J. S. Haskell, Col.	Mar., 1917
W. L. Roark, Tex.	Mar., 1917
Chas. F. Giese, N. Mex.	Feb., 1917
M. E. Goller, Pa.	Feb., 1917
J. Potthoff, Neb.	Feb., 1917
G. M. Garety, Mich.	Feb., 1917
Ernest Finley, Pa.	Feb., 1917
A. Tillman, Cal.	Feb., 1917
Walker Bros., N. Z.	Feb., 1917
G. W. Whittington, W. Va.	Feb., 1917
S. H. Austin, N. Y.	Jan., 1917
H. Kahl, Ia.	Jan., 1917
J. H. Bergen, Kan.	Jan., 1917
H. Grimm, Utah	Dec., 1916
A. H. Gooding, S. Aus.	Dec., 1916
Leonard Smith, N. J.	Dec., 1916
C. F. Shaw, Man.	Dec., 1916
W. Elward, Pa.	Dec., 1916
W. W. Egly, Pa.	Dec., 1916
Jos. Boyer, Mich.	Dec., 1916
J. Williams, N. S. Wales	Dec., 1916
J. H. W. Schneider, Cal.	Dec., 1916
W. Sauer, Minn.	Dec., 1916
F. F. Darling, Cal.	Dec., 1916
Chas. Newland, Cal.	Dec., 1916

NAME	Subscription Paid to
J. T. Brahm, Ia.	Dec., 1916
P. H. St. Louis, Wis.	Dec., 1916
A. E. Nickols, Okla.	Dec., 1916
C. J. Hall, Wash.	Dec., 1916
Bob Fricke, Ala.	Dec., 1916
Joeris Bros., Tex.	Dec., 1916
R. Clemens, Conn.	Dec., 1916
Scheffley & Schmitt, Pa.	Dec., 1916
A. Brause, Ohio	Dec., 1916
J. E. Beatty, Mo.	Dec., 1916
H. J. French, N. Z.	Nov., 1916
F. N. Browning & Son, Ky.	Nov., 1916
J. Macuab, Scotland	Nov., 1916
P. Gessen, Ill.	Nov., 1916
J. W. Gribble, S. Aus.	Nov., 1916
W. G. Sim, N. Z.	Nov., 1916
H. V. Ruehl, Ala.	Nov., 1916
G. Lindborg, Ind.	Nov., 1916
Pittman Stell, N. C.	Nov., 1916
J. S. Finkenbiner, Ind.	Nov., 1916
R. D. Wixom, N. Y.	Nov., 1916
E. A. Knapp, N. Z.	Oct., 1916
T. J. Haskins, N. S. W.	Oct., 1916
Lothian & Skinner, N.S.W.	Oct., 1916
W. B. Knouff, Ala.	Oct., 1916
Gorham Bros., Ia.	Oct., 1916
W. H. F. Brauch, N. C.	Oct., 1916
Clark Olds & Co., Neb.	Oct., 1916
Irwin Scott, N. Y.	Oct., 1916
C. E. Durham, Kan.	Oct., 1916
James Poettgen & Co., Mo.	Sept., 1916
Jno. Goetzinger, Ia.	Sept., 1916
Geo. Fleckenstein, Cal.	Sept., 1916
Geo. Hill, Aus.	Sept., 1916
E. C. Beard, Aus.	Sept., 1916
J. K. Glinicki, Mich.	Sept., 1916
Oscar Buhner, Md.	Sept., 1916
A. J. Hammond, Cal.	Sept., 1916
Robert Murray, Cal.	Sept., 1916
D. E. Wright, Pa.	Sept., 1916
J. S. Haskell, Col.	Sept., 1916
R. Sommer, Aus.	Sept., 1916
J. A. Sequin, Can.	Aug., 1916
James Clarke, Jr., Aus.	Aug., 1916
Dispatch Fdy. Ltd., N. Z.	Aug., 1916
C. P. Robertson, S. Africa	Aug., 1916
A. C. Lodwig, Cal.	July, 1916
A. A. Bahlke, Mich.	July, 1916
J. K. Hansen, Aus.	July, 1916
J. B. Barker, Ill.	July, 1916
H. M. Larsen, Wis.	July, 1916
Geo. P. MacIntyre, Me.	July, 1916
Jas. A. Buchner, Mich.	July, 1916

NAME	Subscription Paid to
G. R. Harrison, Aus.	June, 1916
J. Waycich, S. Africa	June, 1916
W. Voight, S. Africa	June, 1916
Martin Jensen, Wis.	June, 1916
Chester Humbert, Wis.	June, 1916
Lincoln Underhill, Cal.	June, 1916
M. Broton, N. Dak.	June, 1916
Hans Eriksen, Ill.	June, 1916
C. Morrell, N. Brunswick	June, 1916
J. O. Conrad, Kan.	June, 1916
Adam Schmitt, Mich.	June, 1916
James Sinclair, W. Aus.	May, 1916
H. Baker, Aus.	May, 1916
E. Q. Krehbiel, Kan.	May, 1916
C. H. Cairns, N. Y.	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vt.	May, 1916
C. A Stebbins, Kan.	May, 1916
Sanford Baker, Mo.	May, 1916
P. A. Peterson, Ia.	April, 1916
D. E. McDonald, Fla.	April, 1916
James Baxter, S. Africa	April, 1916
E. P. Dignan, S. Aus.	April, 1916
W. H. Winget, Vt.	April, 1916
C. Schmid, Neb.	Mar., 1916
A. Rockenschup & Son, La.	Mar., 1916
C. H. Alexander, N. Y.	Mar., 1916
A. M. Harebo, Wis.	Mar., 1916
George Howard, Kan.	Mar., 1916
G. N. Follmar, Neb.	Mar., 1916
W. Willoughby, Mich.	Mar., 1916
H. Hoffmeyer, N. J.	Mar., 1916
Frank L. Locke, N. Y.	Mar., 1916
Frank L. Evarts, Conn.	Mar., 1916
C. R. Winget, Vt.	Mar., 1916
H. & J. Chisholm, N. Z.	Mar., 1916
C. F. Molkenten, Aus.	Mar., 1916
H. D. Phillips, S. Aus.	Mar., 1916
F. J. Flessel, N. Y.	Feb., 1916
E. P. Jones, Kan.	Feb., 1916
E. J. Bishop, N. Y.	Feb., 1916
J. N. Tyler, Ohio	Feb., 1916
Chas. H. Kern, Ill.	Jan., 1916
J. H. Ecroyd, Cal.	Jan., 1916
Thomas Horne, Aris.	Jan., 1916
Charles Tucker, Mich.	Jan., 1916
M. Klitgord, N. Y.	Jan., 1916
O. Stenning, S. Dak.	Jan., 1916
Iver Johnson Arms and Cycle Works, Mass.	Jan., 1916
Feldmeyer & Schaake, Kan.	Jan., 1916
E. J. Bufe, Ia.	Dec., 1915
Geo. Sykes, Aus.	Dec., 1915
W. Patrick, N. Y.	Dec., 1915
Jas. A. Sharp, Mass.	Dec., 1915
J. Krahulec, Ill.	Dec., 1915
P. E. Dahlfurst, Cal.	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Neb.	Dec., 1915
G. S. Fisher, Neb.	Dec., 1915
Printers Supply Company, Neb.	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W.Va.	Dec., 1915
C. J. Ash, Kan.	Dec., 1915
F. H. Joslin, Mass.	Dec., 1915
C. W. Ames, Mass.	Dec., 1915
C. L. Sorensen, Neb.	Dec., 1915
E. Williams, N. Y.	Dec., 1915
W. Urquhart, N. Z.	Dec., 1915
W. Rupe, Kan.	Dec., 1915
L. S. Kocher, Ia.	Dec., 1915
P. W. Frazer, N. Z.	Dec., 1915
J. P. Carrick, Ind.	Nov., 1915
D. Codere, Ill.	Nov., 1915
F. S. Woody, Ia.	Nov., 1915
George H. Ilsley, Mass.	Nov., 1915
M. I. Huff, Mo.	Nov., 1915
Stephen Wachter, Pa.	Nov., 1915
C. J. Willard, Ill.	Nov., 1915
J. S. Lee, Wash.	Nov., 1915
L. P. Mortensen, Mich.	Nov., 1915
W. Foulkes, England	Oct., 1915
N. W. Hammond, Col.	Oct., 1915
P. G. Dairdson, N. Dak.	Oct., 1915
C. N. Mills, Cal.	Oct., 1915
H. Dier, S. Aus.	Oct., 1915
S. B. Goodsell, Conn.	Oct., 1915
D. F. Hallowell, Ia.	Oct., 1915
A. Roth, Ill.	Oct., 1915
C. C. Perry, Aus.	Oct., 1915
Sidney Stevens Imp. Co., U.	Oct., 1915
W. H. Findlay, N. Z.	Oct., 1915
R. F. Watson, Cal.	Oct., 1915
H. R. Stone, Conn.	Oct., 1915
F. Teuber, Ga.	Oct., 1915
Ed. Hammill, Cal.	Sept., 1915
R. D. Simkins, Pa.	Sept., 1915
T. J. Reynolds, Pa.	Sept., 1915
Wm. Bates, Tex.	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, W. Va.	Sept., 1915
Hugh L. Lynn, Kentucky	Sept., 1915
Advance Blacksmith Co., Mo.	Aug., 1915
A. Chargois, Queens'd, Aus.	Aug., 1915
A. M. Byfield, W. Aus.	Aug., 1915
C. E. Allen, Neb.	Aug., 1915
M. J. Roder, Mont.	Aug., 1915
J. E. Lyon, Tex.	Aug., 1915
F. W. Krenz, Cal.	Aug., 1915
J. W. Storment, Ill.	Aug., 1915
Jos. P. Rotolinski, Mass.	Aug., 1915
T. O. Chittenden, N. Z.	July, 1915

NAME	Subscription Paid to
The Goldfields Diamond Drilling Co. Aus.	July, 1915
J. A. Lawton & Sons, S.Aus.	July, 1915
W. C. Jones, N. C.	July, 1915
J. Picotte, Yukon Ter.	July, 1915
George M. Ferree, Ut.	July, 1915
S. A. Stilles, Ohio	June, 1915
E. L. Herring, Fla.	June, 1915
G. R. Twedell, Miss.	June, 1915
H. P. Houghton, Ill.	June, 1915
J. W. Ivie, Ut.	June, 1915
B. A. Parker, Ga.	May, 1915
J. C. Klein, Miss.	May, 1915
N. B. Demarest, N. J.	May, 1915
E. E. Mercer, Kan.	May, 1915
Schintgen & Maier, Minn.	May, 1915
A. E. Spangberg, Ore.	May, 1915
W. S. Helmecke, Tex.	May, 1915
F. F. Putnam, Pa.	May, 1915
Otto Siebler, Tex.	May, 1915
W. A. Matson, Ut.	May, 1915
A. Seewale, Ill.	Apr., 1915
E. N. Harris, N. Y.	Apr., 1915
W. L. Whitebread, Aus.	Apr., 1915
I. P. Chiappa, Bermuda Is.	Apr., 1915
C. Isaacs, Cal.	Apr., 1915
P. Himes, Ore.	Apr., 1915
D. E. Fish, Ore.	Apr., 1915
W. M. McCurdy, Ore.	Apr., 1915
C. Schmidt, S. Dak.	Apr., 1915
R. E. Bethick, Pa.	Apr., 1915
Otto Brandt, Tex.	Apr., 1915
Morris & Gezek, Tex.	Apr., 1915
Z. M. Wesley, Ark.	Mar., 1915
C. Vogel, Neb.	Mar., 1915
J. J. Casey, Nev.	Mar., 1915
T. Frazier, N. J.	Mar., 1915
T. Beatty, N. J.	Mar., 1915
W. A. Lippincott, N. J.	Mar., 1915
G. R. Boggs, Ala.	Mar., 1915
J. H. Helmes, Cal.	Mar., 1915
R. Yuill, Ill.	Mar., 1915
J. Marshall, Ind.	Mar., 1915
W. A. Connor, Ind.	Mar., 1915
C. Lagola, Ohio	Mar., 1915
J. J. Purington, Ohio	Mar., 1915
E. B. Downey, Ohio	Mar., 1915
C. D. Camp, N. Y.	Mar., 1915
G. W. Blakey, Okla.	Mar., 1915
E. S. Sheets, Pa.	Mar., 1915
J. E. Johnson, Pa.	Mar., 1915
Van Den Wildenberg Brothers, Wis.	Mar., 1915
V. Priessnitz, Wis.	Mar., 1915
F. J. Ties, Wis.	Mar., 1915
T. E. Birchmore, Ga.	Mar., 1915
L. A. Campbell, Ia.	Mar., 1915
J. J. H. Fieriks, Minn.	Mar., 1915
J. Hiemanz, Minn.	Mar., 1915
J. L. Schurte, Mo.	Mar., 1915
University of Tennessee, Tennessee	Mar., 1915
A. Thalman, Tennessee	Mar., 1915
S. Martin, Texas	Mar., 1915
R. L. Killingsworth, Tex.	Mar., 1915
W. H. Leonard, Pa.	Mar., 1915
W. A. Shive, Pa.	Mar., 1915
R. J. McLaren, Ariz.	Mar., 1915
A. Murphy, Idaho	Mar., 1915
J. F. Prater, N. Y.	Mar., 1915
Thoreson & Stock, Wis.	Mar., 1915
C. Finzer, N. Y.	Mar., 1915
W. E. Bedford, N. W. Ter.	Mar., 1915
R. Armstrong, Ont.	Mar., 1915
J. T. Hines, Va.	Mar., 1915
T. W. Beall, W. Va.	Mar., 1915
O. Coneaux, La.	Feb., 1915
J. H. Lomgley, Mass.	Feb., 1915
J. W. Faulk & Son, Ala.	Feb., 1915
P. F. Marcotte, Cal.	Feb., 1915
L. Lau, Ill.	Feb., 1915
A. L. Erickson, Ill.	Feb., 1915
Joseph Kuhl, Ill.	Feb., 1915
F. Pietzschke, Mo.	Feb., 1915
W. Monk, Ohio	Feb., 1915
J. P. Maw, N. Y.	Feb., 1915
H. T. Palmer, Pa.	Feb., 1915
G. E. Baldwin, Pa.	Feb., 1915
George Morrison, Del.	Feb., 1915
T. B. Tweet, Ia.	Feb., 1915
C. Nielson, Ia.	Feb., 1915
J. B. Arnold, Ky.	Feb., 1915
J. W. Tibbot, Mo.	Feb., 1915
W. M. Driskill, Ore.	Feb., 1905
W. Walborf, Ore.	Feb., 1915
L. Fairhurst, R. I.	Feb., 1915
G. Solberg, S. Dak.	Feb., 1915
A. Enty, Pa.	Feb., 1915
W. F. Daubman, Ill.	Feb., 1915
O. B. Skonnord, N. Dak.	Feb., 1915
J. E. Tilton, Ore.	Feb., 1915
H. M. Seely, N. Y.	Feb., 1915
H. Otto, N. J.	Jan., 1915
W. Rand, N. H.	Jan., 1915
W. W. Morrison, N. Y.	Jan., 1915
J. A. Rager, Md.	Jan., 1915
A. E. Roesner, W. Aus.	Jan., 1915
T. Horne, Aris.	Jan., 1915
H. B. Draper, Ind.	Jan., 1915
C. W. Enyeart, Ind.	Jan., 1915
F. F. Yarian, Ind.	Jan., 1915
F. J. Schmaidt, Mo.	Jan., 1915
Brown & Peterson, N. D.	Jan., 1915
J. J. Thompson, Ohio	Jan., 1915
C. Culver, Ohio	Jan., 1915
L. Schulte, Ohio	Jan., 1915
G. W. Cross & Son, N. Y.	Jan., 1915

Ten Questions For the Month

The questions this month are on automobile repairing and overhauling. The general smith will need to know the answers to all of these questions during the coming season. If you are unable to answer these queries, better study up on automobile repairing.

1.—Give three or more ways in which a nut may be prevented from working loose by reason of the continued jarring of the car.

2.—How may carbon deposit be removed from the cylinder walls and piston?

3.—What kind of gaskets or material would you use to make the various joints and connections on the car?

4.—What injury results when the front wheels of the car are not parallel?

5.—What precautions must be observed when replacing the broken balls in a bearing?

6.—Give directions for regrinding valves.

7.—Explain several ways of making temporary repairs to broken rods and tubes.

8.—How may a crack in a water jacket be repaired?

9.—When a valve stem is too short to properly operate a valve, how would you lengthen it?

10.—How may ball bearings be removed and inserted with least trouble when not held by a ball cage?

Answers To Questions in March Issue

1.—Profit is a dividend paid upon the investment after all expenses have been met.

2.—Advertising.

3.—Taxes on the building are cared for as a private account of the building owner.

4.—Both are added to the cost of the goods transported.

5.—Interest on investment is the rate that the business should pay the owner for the money invested. It should equal the rate he would be compelled to pay a banker for the use of the money.

6.—Yes, he must charge the business with rent, and from the rent he should pay taxes on the building and for repairs and improvements.

7.—The same as though the building owner were renting it to an outsider.

8.—They are charged under business losses, which is an account under incidental expense. And to the amount of the account lost must be added the expense of attempted collection.

9.—It does not. There are unpaid accounts that represent part of your investment just as much as goods and stock do. Those accounts which are reasonably sure of collection must be added to get a true statement of the amount invested.

10.—To determine to a certainty whether business is being done at a loss or at a profit; to enable the business man to eliminate unnecessary expense; to know without question the financial standing of the business; to know costs, expenses and losses or profits, accurately, and to know who owes what.

A Loving Cup For Children's Friend

On page 142 of the March issue, we told about Mr. Friend—"a real boy at seventy-one"—who leased a hill in the suburbs of Brooklyn, New York, and presented it to the children of the neighborhood for use as a toboggan.

And now comes a story from that same hill that will warm the heart of every lover of healthy childhood.

On the afternoon of the last Sunday in February, Mr. Friend was called from his home by two girls, who said a friend of his wanted to see him over on the hill. Mr. Friend accompanied them there, and was surprised to find women and children from the neighborhood there. When he had been brought to the center of the gathering he was addressed by Miss Margaret Nurge, eighteen years old, on behalf of the children. Said Miss Nurge:— "The children around here desire to present to you a token in remembrance of a kind favor that has been done for them. The act of kindness which you did them was the leasing of this hill for them to enjoy their sledding on during the recent snowfall. The kindness is more than appreciated. We hope that you will live to see these children gathered here as fathers and mothers. We wish that this cup will last forever, as our love for you will never cease."

The cup was purchased with the pennies of the boys and girls who since the hill was leased have been saving for that purpose. On the cup there are the initials "A. F. F." and an inscription reading. "To one who has been the best friend that the children of Sheepshead Bay have known, this cup is presented in grateful recognition of his services in leasing a hill for us to coast upon. The Children of Sheepshead Bay."

Mr. Friend says: "He who has a child for a friend has a friend indeed."

And the child who has Friend for a friend has indeed a friend, is no less true.

The Use of Leather In Repairing Wheels

C. Iwert

I note in Brother G. N. Sidders' reply to Mr. Mountain's question that he claims that it is not usually good practice to put leather in the joints of the felloes. He may be right to a certain extent, but in some cases I find it the best that I can do. In the past nine years of my experience I have set tires on wheels where no repairman had laid hands and the wagon or buggy had only been out two or three years. The wheels were entirely solid at the hub and rim and after even wedging the spokes in the rim and seeing that the rim was down on the spokes, I found from 1/8 to 3/8 of an inch space between the joints, and the wheels were not

dished, either. Now in such cases it is not likely that the felloe was cut too short by the repair-man, as Mr. Sidders states. Nor would I say that the builder cut the rim too short, for if he had, the wheel would have been dished. In the case in question the wheels have been put up in a good manner, but the defect was simply that the wood was not perfectly dry when put in the wheel. It simply dried and shrunk away from the tire after being exposed to usage and weather. In such cases I have set the tires on the wheels without putting pieces in the joints and had badly dished wheels. Then I began to put leather between the joints. Sometimes I would use pieces of wood, flat iron or belting and kept the wheels from dishing with good success.

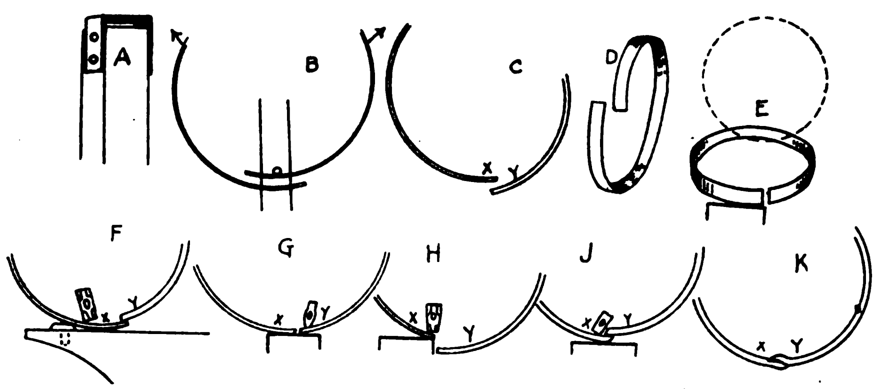
In regard to losing out and lasting, I have found that on wagons they will lose out soon if they are not provided with a felloe clip. In such cases I tack them with small nails. On buggy wheels they will stay without tacking, as the clip holds them in place. I have had the best success with leather and rubber belting. I can show wheels on which I used leather seven years ago as hard and solid as desired. Wood is not very good as the weather causes it to split and crack and fall out in pieces. Iron is not good either for it is hard to keep in and if it stays in, it will be nothing but a piece of rust after a few years. When I use leather or belting I fit the same rather tight, as it will give a little from the pressure of the tire.

A person has to use his own judgment in cutting the felloes. If the wheel is loose in the hub and rim it will be necessary to leave an opening at the joint. If the wheel is solid in the hub and rim and you are sure the rim is down on all of the spokes, your joints can touch, but they should not bind. This is for old felloes. If new felloes are used there should be a little opening in the joints. I have had the best success in giving buggy wheels all the way from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch set and wagon wheels from $\frac{3}{16}$ to $\frac{3}{8}$ of an inch with the heat, according to the condition of the wheel.

How To Weld Tires

P. V. Johnson

First have a post set in the ground or floor, as at A, extending $2\frac{1}{2}$ feet above the ground and slope the top towards the back. Plate the top and put on a heavy clevis with an opening large enough for your tire to slip in. Slip in just enough to catch and push down on the tire. This bends the end so that it will go into the bender. If your tire happens to be bent together considerably, put under a pin which is driven into the anvil block or any other solid position, the smith and helper pulling in opposite directions. If the tire is not so close together, set the tire on the floor and open the end up, lift up and bring it on the floor. It will spring apart very easily. Be careful, however not to spread it too far apart, as it will require extra work to bring it together again. This can be done by striking the tire where it most needs it. If the ends do not meet, raise your tire and drop it edgeways on the anvil, keeping it on a level with the anvil. This will cause it to spring over easily. This also has a tendency to spring the tire apart.



HOW TO WELD TIRES, EASILY, QUICKLY AND SOUNDLY

Now measure your tire and mark it three eighths of an inch shorter than the wheel, and spring end X under end Y and place in the fire. Just before reaching the welding heat, remove the tire from the fire and with the assistance of a helper drive the two ends apart with a hot chisel. Then scarf X with same heat by tilting the tire towards the helper and driving straight down with a heavy hand hammer. If the end X does not lay tight against Y, drive it tight with the hammer Now note the difference between this lap and the old method of scarfing both ends on the inside—: You will note that the lap at K leaves your weld to make higher on the inside than your tire is at each side, which is also lighter. The reason for burning off the edges on each side the weld is to get a good weld in one heat, clean and burn all the charcoal your forge will hold, wet it down well, and you are able to weld several tires before burning any more coal. Use no green coal in the fire, whatever. Place the tire in the fire, keeping lap well to your side of fire. Heat not too fast, shifting the tire to bring the heat in the proper place, which practice will help you determine. Use for a flux yellow molder's sand and scales from the bender, mixing it half and half. Use plenty of it. When the tire is getting too hot on the edges, slow down and let the center come up. This helps to keep it from burning. Weld up and swedge the edges. With a little practice one heat is all you will need to make on a tire.

To lift and handle a tire easily from anvil to forge and back, place the left hand on the tire just above the head and with right hand reach over through the tire instead of under, pulling the tire over the left thigh and you will discover that you have the tire on a balance right in your hands.

Cold Tire Setting and Blacksmithing In General

A. J. Yeager

It seems that there is a hatred against cold tire setting and that the method used does not take well. I have a cold tire setter and have had it for about three years, and when I use it for what it is intended for it does good work, but when a man thinks that he can set all kinds of tires and set wheels in all

the conditions that we get them, why it is simply out of the question to do so. The cold tire setter is an adjunct to the trade for advancement, the same as a lot of other machines that have been added for the benefit of the blacksmith. Perhaps quite a number of the old timers will remember the old bench drill machine with a hand-made drill, and the old bellows with its leaky sides, and the old way of upsetting tires by kinking them up over the horn of the anvil and placing them onto an old rasp and have the helper hold down one end and the smith the other end, and using the hammer to drive down the kinked part to upset it. I have set many a tire that way, before I had a tire upsetter.

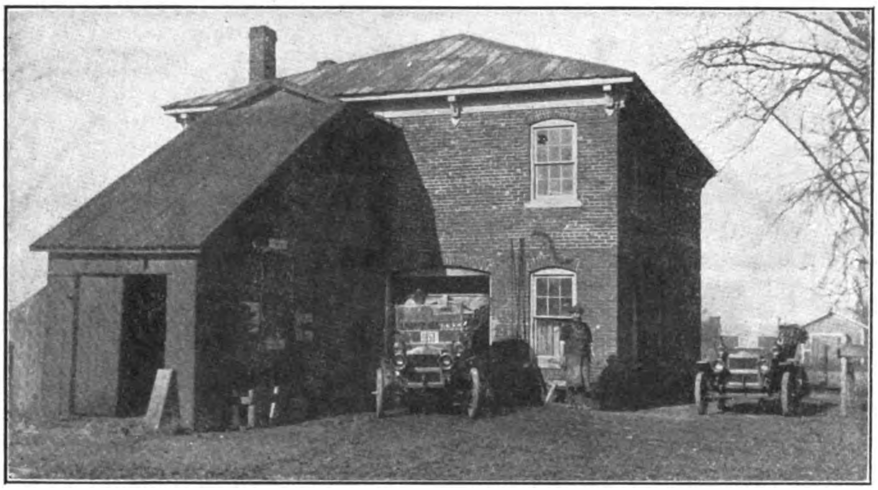
Then came the gasoline engine for cheap power, and the trip hammer and the up to date upright drill machine, with the nice twist drills to make holes just the size you needed them to make bolts fit snug. Then came the punch and shears to lighten the work of the smith, and nowadays you cannot find a good shop that is not equipped with these tools. Then came the emery wheels, and every man in the business that does any plow work is prepared to polish the lays that he sharpens, and in some places he has to harden them before polishing them so as to make them scour. All of this came about in the last thirty years, and the smith today is not the smith that he was thirty years ago. He does not have to do the forge work that he did then. Today when you hire a man to work in your shop for you and set him to make anything out of iron that requires any forging he says I never made a thing like that in my life, how do you do that? And if you want it made, it is up to you to show him how it is done or make it yourself. But when pay day comes he is there and wants as much money as if he really understood the business.

Now, the method of cold tire setting is all right when properly done, but bear in mind that the people who make the cold tire setting machines simply make the machines. They put no brains in them. That part is to be furnished by the smith who performs the work with the machine that the machine is intended for. And when a smith gets a cold tire setter and tries to use it without using his brains he is simply up against it. Of course he says it is no good and it will not do the work it is intended to do; and he advises the people through the Journal that they had better not spend any money for a thing like that.

Now I will venture to say that out of every hundred that have cold tire setters there is perhaps one or two that find fault with the machines and want to see their name in print. The others simply read the kickers' articles and laugh about them and consider that they are too silly to be noticed. Some of these fellows say that they are from Missouri and have to be shown. That is the trouble with all of them in old Mo—. Today we are after the money the same as any other line of business men, but the trouble is that a lot of us let some one tell us all about our business and what we should have for a job in a money way.

I had occasion the other day to do a job for a large department store in our town, and when I went to collect my account the manager tried to tell me that I charged too much for certain parts of the job. I simply told him that when I did work for them that I felt competent to place my charges on the article I do, and not be dictated to by him. That when I bought anything of him he made the price, and I considered that I had the same right pertaining to my business.

Let us help one another in this trouble, and not make wagers and stir up strife. Let us be business men, the same as the heavy hardware jobbers that come to us to sell us our goods, which we, in turn, have to sell again to make a living.



MR. E. E. VINCENT OF ILLINOIS DOES BLACKSMITHING, GENERAL REPAIRING AND ALSO LOOKS AFTER AUTOMOBILES

Another Legal Phase of Retail Collections

ELTON J. BUCKLEY

Consider another phase of retail collections. One of the weak points of the average retail business is undoubtedly in collections. Naturally this refers only to the credit business, but as it is estimated that fifty retail establishments do a credit business to every one that sells for cash, it is obvious that the question is an important one to the trade at large.

In order to enable a smith to attend to his collections intelligently some knowledge is necessary as to how far he can legally go in bringing pressure to bear upon his debtor, short of actual suit. It is a fact that many a debtor, wholly without reachable assets, can be made to pay without suit if approached in the right way.

Knowledge on this point may also save you from becoming the victim of itinerant collection agencies, who obviously can have no secret ways of pressing a debtor, and every one of whose methods is just as sharply limited by the law as the methods of the merchant himself.

Following are presented a series of three letters, which will be found to be very effective in the collection of the debts of the average business. Of course, neither this nor any other plan will collect all debts, but the

letters here presented, which incidentally have been in actual use for many years, have brought results in a large number of cases which had been given up as hopeless.

LETTER NO. 1

DEAR SIR:—You may or may not know that your account with us now amounts to .... We have not pressed the matter, as we are always desirous of accommodating our customers to the utmost limit of our convenience. At the present time, however, we need this money and will highly appreciate at least a substantial payment on account.

Very respectfully yours,

This letter contains nothing specially notable, but it is surprising how many debtors it has inspired to pay their claims. Naturally they are not usually the tough ones. To those who ignore the first letter, the following may then be sent:

LETTER NO. 2

DEAR SIR:—We feel somewhat disappointed that our very moderate request of recent date for a payment on account of our claim has met with no response. Does it seem exactly fair, Mr. ...., after we have accommodated you with material and goods—for which we have long since paid—and have waited so long for our money, that you should totally ignore our request to pay at least something on account.

We respectfully repeat our request for a remittance by.........and we sincerely trust that you will not compel us to be insistent in any other way.

Yours truly,

The second letter has brought the money out of a remarkably large percentage of delinquent debtors who seemed to be impressed somewhat by the argument as to fairness which it presented. The usual dunning letter is a flat demand for the money. Sometimes a little reasonable argument helps wonderfully.

The third letter is intentionally sharp. It is intended to be used with debtors whom it is suspected have no assets and are, therefore, judgment proof:

LETTER NO. 3

DEAR SIR:—Our two letters of recent date regarding our claim still remain unanswered and it therefore becomes necessary to inform you that we propose to use a more vigorous method to recover this money. We have been advised that you are without legal assets and that a judgment against you would therefore avail us nothing. Nevertheless, you may not be without shame and if this claim remains unpaid by.........we shall issue a writ against you and shall obtain judgment through it at the earliest possible moment. When the judgment has been obtained, we shall advertise it in the local newspapers for sale to the highest bidder. We are advised by counsel that we have a perfect right to do so. It may be that some one may wish to acquire this judgment for some reason and that in this way we may recover a portion of our claim. At any rate, the experience will probably be worth its cost as a means of saving others from our own fate.

Respectfully yours,

This letter has been shown to have the strongest effectiveness. It threatens nothing that cannot be legally done, for it is well established that a judgment properly obtainable can be assigned like any other right, from which it naturally follows that it can be advertised for sale. In advertising a judgment, however, care should be taken to say nothing whatever that will hold the debtor up to obliquy or ridicule, as the courts of all States are strict in protecting debtors from anything of that kind.

Every one of the above letters can legally be sent by mail or sent by hand. One of the most successful collection agencies obtains its results largely by the plan of obtaining judgments and advertising them for sale, or threatening to do so.

Under the Federal laws no postal card can be sent through the mails bearing a dun or an obvious request for the payment of a claim. Neither can demand be made for payment in any other public fashion.

(Copyright by Elton J. Buckley)

The Furnace For Hardening High-Speed Steel In a Lead Bath

W. J. KINCH

The engraving illustrates a furnace used at the Colburn Machine Tool Co.'s plant at Franklin, Pa., for hardening high-speed steel. Fig. 1 shows a front view of the furnace, the top of which is on a level with the shop floor. Fig. 2 is a sectional view showing brick pillar for crucible support and crucible in place. Fig. 3 shows the top plate with two swinging lids. Fig. 4 shows front plate of ash pit with sliding door. Fig. 5 shows the furnace grate. Fig. 6 pictures the sliding door of the ash pit.

We have been using this type of furnace for five years and have had the best of results. We harden forming tools which are finished to size before being hardened without scaling or altering the shape in the least. We use hard or 36-hour coke for fuel, and chemically pure lead. The advantages of this process are no scaling or blistering, no changing the shape and an even heat no matter how many different shapes or sizes there are to the tool, if the furnace and tool are handled right.

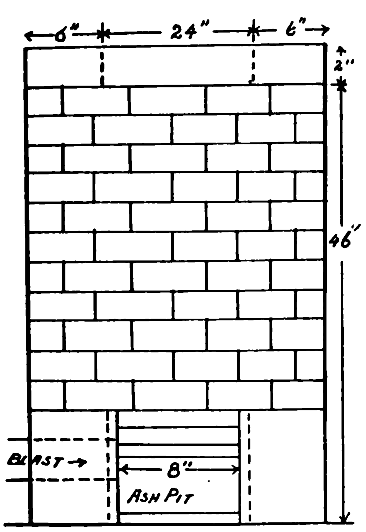


FIG. 1—SHOWING FRONT VIEW OF FURNACE

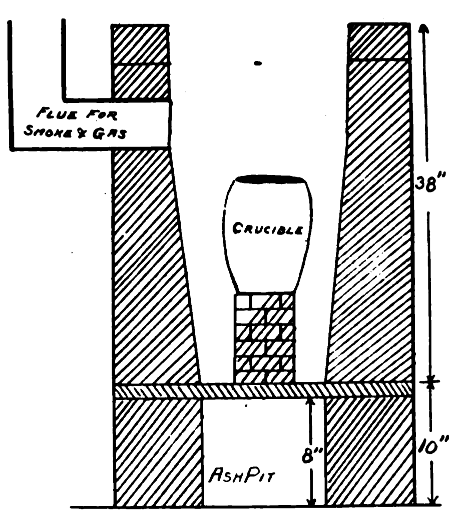
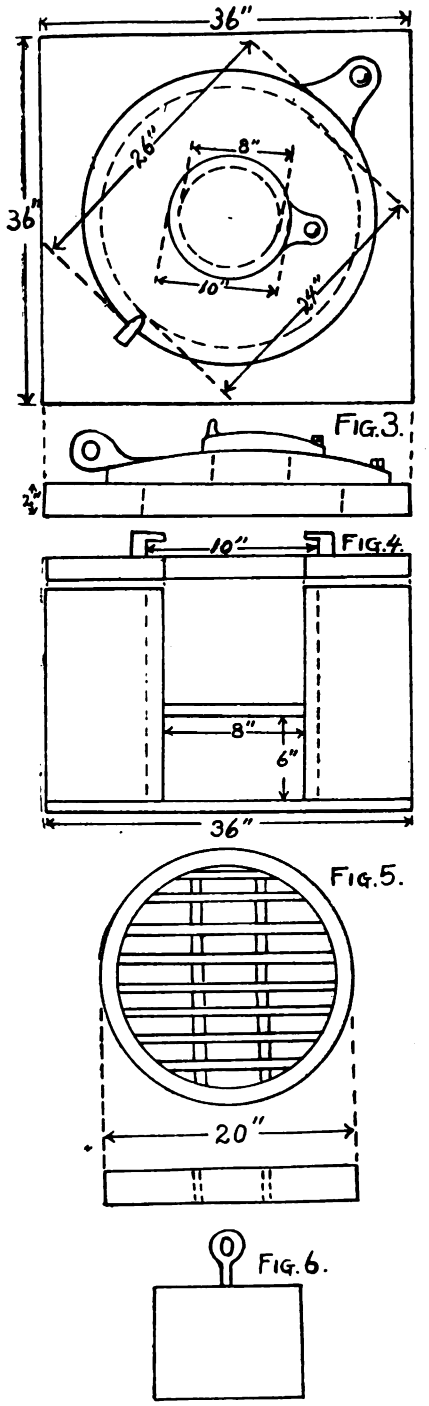


FIG. 2—THIS IS A SECTIONAL VIEW OF FURNACE

I have met several steel workers who were surprised to learn that lead could be used to heat steel to the fusing point. It can, however, be done.

In lighting the furnace we fill in around the pillar or crucible support with cold coke, placing the



DETAILS OF FURNACE PARTS

crucible on the pillar, and then build fire around it. When the lead is melted we place an inch or two of pulverized charcoal over it to prevent the air striking the lead. Then our attention is given to the articles to be hardened.

All finished tools should be covered with a coating of dope to prevent the lead from sticking. It is best to heat pieces to a red heat before putting in the lead, as this prevents chilling, and the heat can be brought up much quicker. When the proper heat is reached, remove from lead and quench in oil, or cool with compressed air as the case requires. Our quenching bath is made up of two parts Atlantic red oil, one part kerosene, with one quart of salt to every ten gallons, which gives good results. Any one having this kind of work to do will find that this method will give perfect satisfaction.

The dimensions of the various parts of the furnace are plainly marked in all the engravings showing both the complete furnace and the details. Readers should therefore have little or no difficulty in building a furnace of this kind. And in the average shop little difficulty should be experienced in getting the various parts made or the smith can make them himself exactly as he wants them.

The Proof of the Chisel

In the October issue of 1911 of "Our Journal" Mr. Bert Hillyer wrote an article on "How to Forge Cold Chisels." This article was illustrated by a photographic reproduction of some good chisels and the work they did.

Ever since the publication of that article and picture, Mr. Hillyer has received intimations hinting at the probable use of copper or lead into which to drive the chisels. Mr. Hillyer has therefore sent us one of the chisels driven through a piece of cold one-inch square soft steel.

Mr. Hillyer's letter:

"I am sending a small box by mail containing a 5/16-inch cold chisel which I drove through a piece of one-inch square soft steel cold. The reason I am sending this is because some smiths think it impossible to do such a thing. One smith while visiting me a few days ago told me that, in the shop where he worked, the smiths were sure that the chisels shown in the October paper were driven through a piece of copper or lead and then a photograph taken of them afterwards. After this smith examined the actual chisels he was convinced that they were exactly as the paper explained.

"The chisel I am sending was made from a cheap, common steel such as is used for tapping bars on the furnaces. It was drawn down from a large piece so that it would be thoroughly hammer refined. Careful, even heats were taken and it was worked on the same method as described in October. The piece of one-inch square stock has never been in the fire—it being cut off at the shears as the ends show.

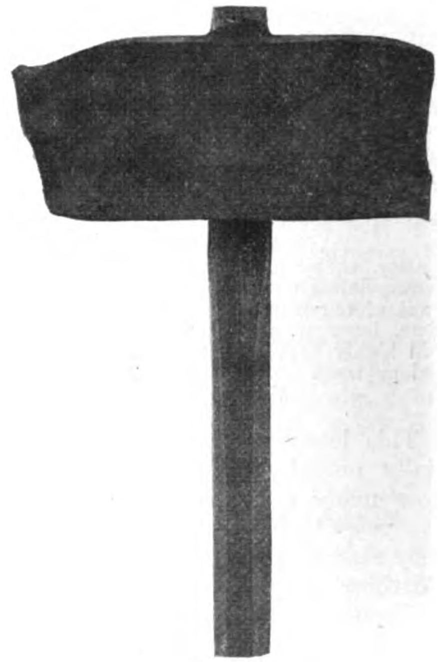
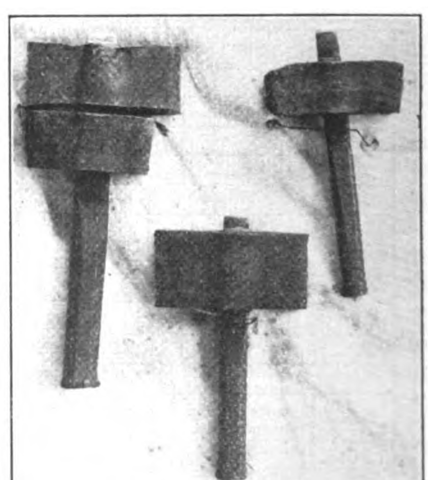


FIG. 1—THIS SHOWS THE CHISEL AND PIECE OF STEEL SENT TO THE EDITOR

"Please examine the piece and tell the readers whether it is copper, lead or soft steel and if the chisel is not smaller than the 3/8-inch one spoken of in the October issue.

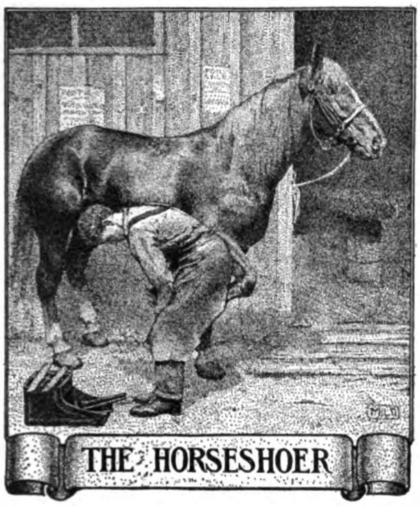
"There is nothing wonderful in this as any smith that will make a close study of steel and the way it should be worked can do the same thing."

The piece in question we have had photographed and it is shown in the accompanying engraving, Fig. 1. The chisel is exactly 5/16 of an inch in section and 3⅝ inches long. The stock through which it has been driven is one-inch soft steel, does not show any indications of ever having been in the fire, and the ends show that both were sheared from the bar. In Fig. 2 is reproduced the chisels which were shown



SOME GOOD CHISELS AND THE WORK THEY DID

in the October issue and which started the discussion. Truly the proof of the chisel is its chiseling.



Horseshoeing and Shoeing Supplies In the Far East

Some Interesting Extracts From Consular Reports

Siam

Horseshoeing is practiced only in Bangkok, being unknown in the interior provinces. Inasmuch as cold shoeing is the only method in general use, no forges are employed. It is only in cases of absolute necessity that hot shoes are used. The tools consist of an anvil, knives, buffers, rasps and pincers. The stock is so small that the itinerant horseshoer can with ease carry the lot on his shoulder, even when he adds several sets of shoes to the burden. The shoes used locally are of two kinds, Chinese shoes, imported from Singapore, and the English or German shoes, imported by local merchants. The former are of poor quality and are used only by men who cater to the custom of livery stables or those who prefer cheapness to comfort for their animals. The latter, especially those imported from Germany, are considered of superior quality. The nails used here are of Swedish make. Knives, rasps, buffers and pincers are sold locally, and are without exception of German make. A local veterinary states that he ordered a supply of shoeing and veterinary instruments from a Chicago firm and had found them most satisfactory as regards both quality and price. American goods of this class are not stocked by any firm, locally, although it is said they would be popular.

Straits Settlements

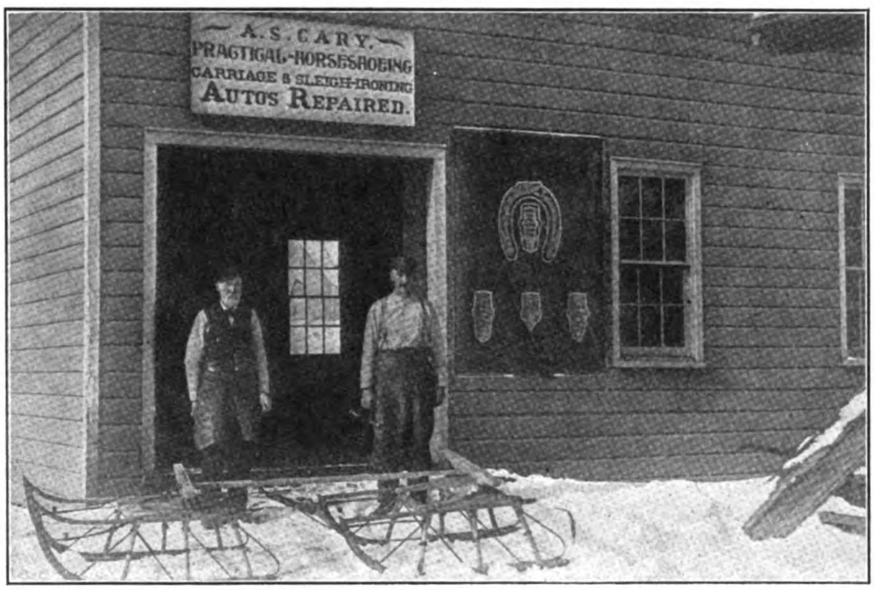
All through the Straits Settlements and the Federated Malay States the blacksmith and wagon repair shops are of a rude and simple character. The tools, as a rule, are imported from Europe, largely from England. The tools of the better shops usually consist of vises, anvils, paring knives, pincers, rasps and large and small hammers. No furnace is used and the shoes are put on cold. Two kinds of shoes are used, the Singapore and the English. The materials and tools come almost entirely from England; practically all the shoes, ready-made nails, iron, etc., come from that country.

Ceylon

The tools used for horseshoeing are the usual ones found in American shops. All shoeing supplies are secured locally, except the shoes. Iron and coal are imported from England. The local farriers limit their work to the shoeing of horses. For the work of shoeing cattle there are special farriers.

Australia

The shops of Victoria usually contain a forge, bellows, shelves for tools, shoes on the walls and the usual tools of the trade. American-made tools, owing to their better shape and finish, are very popular and are more in request than those of English make, the two countries supplying the entire demand. Most of the bellows are made locally, a few being imported from England and none from the United States, which, however, supplies all the blowers that are used in the better-class shops. The whole demand for shoes is met by local manufacturers, of which there are two or three, as is also the case practically with nails. Coal, coke, and charcoal are supplied locally, while the iron is imported entirely from England and the United States in about equal quantities. As far as tools and implements of the trade are concerned, the shops here are well equipped with hammers, rasps, files, pincers, nippers, tongs, hoof testers, knives, pritchels, buffers, hardies, chisels, creases, punches, etc., such as a catalogue of a representative manufacturer of the United States or England would show. Practically all the hardware stores here import and stock farriers' and smiths' tools, and, as the competition for trade is very keen, they may be obtained at reasonable prices.



A NEW YORK STATE GENERAL SHOP

The usual tools are employed in the blacksmith shops in Tasmania. Shoes are mostly made in the shops from bar iron, which is purchased on the mainland of Australia, chiefly from Victoria. I was informed that the workmen in Tasmania cannot be induced to work up old iron, and I know of an instance where one blacksmith has in his shop over 30 tons of old shoes for which he is unable to get a paying price. Factory-made shoes are sometimes used and these are obtained from Victoria, likewise nails. Nearly all

the tools used by blacksmiths in Tasmania are made in their own workshops, but some few, such as pincers and hammers, are imported. American blacksmith's tools were at one time imported, but were said to be unserviceable owing to their softness. Axles for vehicles are now almost always imported, the business being divided between the United Kingdom and the United States. Springs are imported from both these countries and a number are made locally. Malleable iron castings, coach furnishings, bolts, etc., are imported from the United States and the United Kingdom; also tires for vehicles.

In New South Wales most shoes are made on the premises from Hetherton iron from Hingley, England. Nails are imported from Sweden, France, Norway and Spain. Coal from local mines is used. Most of the tools are of American make. The tools used are fullers, stamps, pritchels, turning and chipping hammers and the usual floor-men's tools. Iron is obtained from England and Germany.

New Zealand

The tools in use are mostly American: All supplies are obtained from the United States, Great Britain, Sweden and Germany. Coal is obtained locally. Imported shoes are generally used in the country. Local handmade shoes are used in large towns and cities.

Java

The same kind of tools are used as are employed in the United States. Materials used for horseshoeing, except coal which is supplied locally, are obtained from Netherlands and Germany, although the iron is said to be Swedish. Some of the shops are much like those in the United States while others are bamboo houses with tile roofing, and still others mere sheds. Horseshoeing is done by the natives in the open streets at 10 cents a shoe.

North Borneo

Few horses are used in Borneo and they are rarely shod. No supplies are kept. Iron for blacksmithing is imported from Singapore or Hongkong. Coal and charcoal are produced in British North Borneo.

Samoa

There are five blacksmith shops in Apia, all doing horseshoeing. They are supplied with little machinery, except for drilling, and hand tools are mostly used. Most of the horseshoes are of American manufacture, the nails are English and the iron and coal are supplied from Sydney and Auckland.

Society Islands

In each shop for horseshoeing and repairing will be found a forge, anvil, vise, horseshoeing knife, pincers, rasp, hammer, tire shrinker and bender, a drilling machine, and the usual tools for repairing vehicles. Three of the five shops in Papeete use old-fashioned leather bellows; two have blowers of American manufacture. Three shops have machines for putting on tires. All the tools and machines needed in the shops and all material required for making and repairing vehicles, together with all the horseshoeing supplies, except coal, are imported from the United States. New Zealand coal is used.

A TRIO OF WEST VIRGINIA PRODUCTS—MR. C. E. PARRISH IS RESPONSIBLE FOR ALL THREE

A Painting Suggestion For the General Repair Shop

W. A. Riggleman

If you have a small establishment with a paint shop and wood shop and it has not paid you to buy stock and to employ a painter why not let a painter have your paint shop free of rent? The repairing you get in connection with his repainting jobs will more than pay for the rent. Then help him to get work. He will help you to get work, also, and you will not have the paint shop to worry about. Fix this paint shop up so it will be in good condition and handy to get work in and out. Many small shops have no place to put a finished job. That makes it unhandy,—you will need to hunt a room to store your finished work, for people cannot always take their jobs out as soon as finished. The carriage should stand a week before being taken out, anyway.

Do not try to do repainting if you are not fixed for this work. If not properly situated do not complain if you find yourself unable to keep the services of a painter. Your having done the work yourself has probably lowered the price of repainting. Some blacksmiths and woodworkers do a little painting on the side, so they say, but if you cannot do a thing right do not try it. You hurt your own trade, and finally your customers will say, "He is nothing but a botch all around," and they will take their work where they can get it done right and where an interest will be taken in their work. It does not pay to do anything but first class work if you intend to stay in one location. Good work soon makes a reputation, and then by charging good prices and one price to all you will have plenty to keep you busy. Some shops get a little behind, financially, and their owners will work for anything or will work at a cut price solely for the purpose of beating some one else. Be square with yourself and with everybody, and if you cannot run

the same profitably on this basis it is best to go into some other trade. By all means charge good prices.

Hickory-3

Source, Uses, Preparation, Marketing and Suggestions

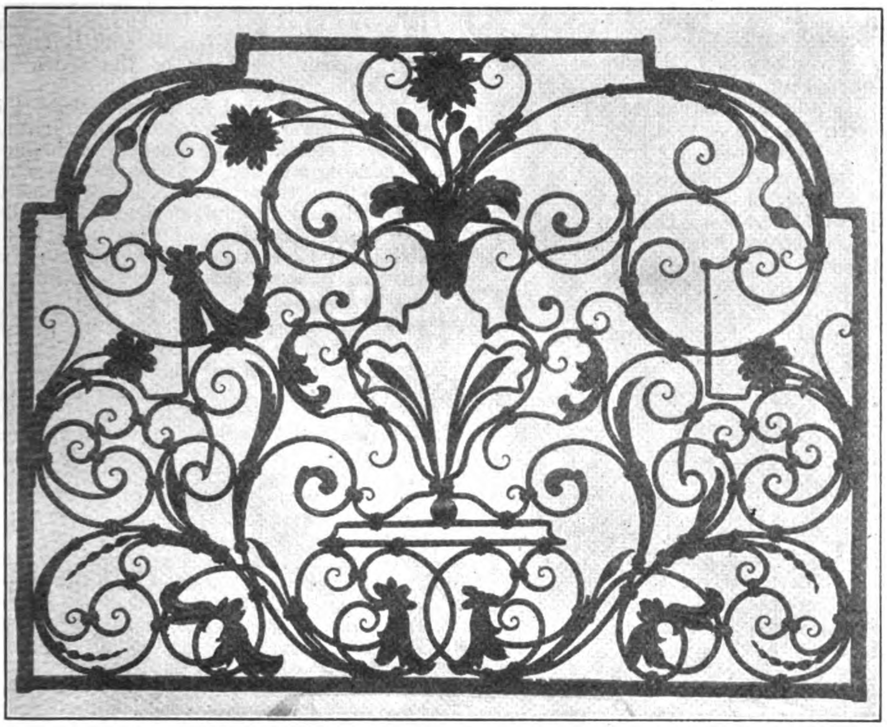
CHARLES F. HATCH
Statistician in Forest Service

Comparatively few of the small mills sell to operators that compete for the output of these mills. Such competition, in fact, is limited to the narrow area in which hickory is now quite abundant. The direct and indirect control of the small mills by the factories and the large number of the small mill operators eliminate the idea of organization among the small millmen, the producers. Such an organization, in order to be effective must be among the factories, the consumers of the rough-turned product. This organization would regulate the economic cutting of stock only, leaving the amount produced and prices to be determined by natural demand and supply.

This plan at first thought may suggest a combination or trust which might become an instrument for limiting the output of hickory. Exactly the opposite is true. The present output is too limited, due to the natural conditions which have been described, and barely meets the needs of the consuming industries. The proposed plan aims solely at getting more useful material out of the present supply. It aims to reduce the waste in hickory to the lowest possible point, and to draw hickory out of those uses for which it is no better than a dozen more plentiful woods and attract it to those uses where it has no substitute.

More than one central yard would probably be needed to act as clearing houses for distributing all forms of products to the various hickory factories. Mills would be kept advised what products were needed at the factories. It is predicted that in a short time no mill would be cutting hickory into barn floor stuff, but would make it into sucker-rod or ax-handle stock. The members would be told how to cut trees in a way to get the most out of them, to saw logs most profitably, to prevent insect injury, to lessen loss by checking, what to do with short pieces, and all other information of value in a business way. The manufacturer's wants would be studied to the end that the hickory he buys may reach him exactly as he desires it. The clearing house would act as a bureau of education, and would push its labors in that field until good hickory ceased to go into wrong uses and every tree cut was worked for all it would make. Moreover, the proposed system would provide an established market and prevent the alternating feast and famine that unsettles the present hickory supply.

Prices, under such conditions, would regulate themselves. For example, if the supply of spokes were greater than the demand while there was a scarcity of handles the price of one would decline and that of the other advance. The mills, being kept constantly informed of the state of the market, would naturally cut down on the one commodity and increase the other. In short, the natural law would work out, but work more speedily and with less loss than where the facts governing the market are not promptly made known.



A SEVENTEENTH CENTURY GRILL FROM A GERMAN FORGE

Recommendations

As a result of the investigation it is recommended:

First. Improved cutting and marketing of stock now cut for "wrong uses," such as bridges, barn floors, grain doors, fences, piling, culverts, crossties, car stock, mine props, rails, cribs, and lagging.

Second. A wider use of pecan trees and of mill and factory waste for smoking meats.

Third. Better protection for green trees, logs, and seasoned products from insect enemies.

Fourth. A wider use of dimension mill waste for the manufacture of small products which must be of hickory. At the present time many mills and factories use the rejects of their larger products for the manufacture of smaller ones. The closer utilization of the offals for their own small products, or the shipment of such rejects to other concerns, is not now profitable because of the lack of proper machinery, and the high cost of labor against the low cost of stumpage. For example, skewers range from 4½ inches in length and five thirty-seconds of an inch in diameter to 16 inches in length and three-eighths of an inch in diameter. The raw material for these products is hickory bolts in lengths of 5 feet and multiples of 5 feet. The manufacturers of the longer-length products point to this as needless waste and hold that their offals would supply a large part of the raw material needed for skewers. The skewer manufacturer, however, has proved that it is more profitable to buy bolts and logs that can easily be fed to the machines than to buy

cheap reject stock that requires much labor in handling and sorting.

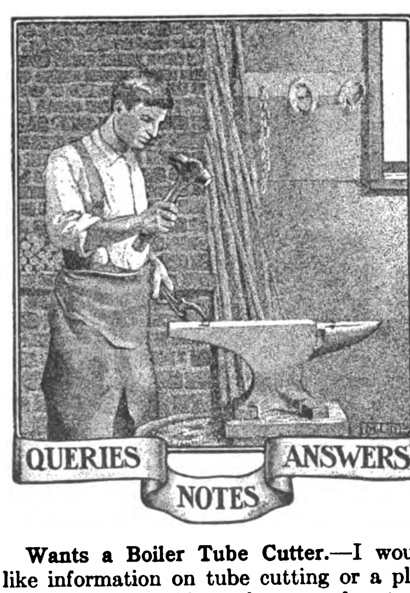
The value of hickory stumpage is now based on the value of the cleared land to the owner. A rise in the price of stumpage caused by basing its value properly on supply and demand will force the manufacturer of small products to buy material now wasted by the manufacturers of large products. It will also bring about the invention of machinery for working up the small pieces.

Fifth. That the hickory users take steps to secure the hickory left standing by the large pine and hardwood companies operating in the lower Mississippi Valley. This report has discussed the reasons which cause these concerns to leave their hickory stumpage uncut at the time they log the rest of their timber, and has submitted three propositions by which the hickory users may secure this additional material. The sale of this timber would be of mutual benefit to the pine and hardwood companies now getting no returns on it and to the hickory users who are in constant need of new supply.

Opportunities

Here are listed a number of live opportunities for live blacksmiths—towns and localities where blacksmiths are needed. If you want to start anew and if you have the necessary energy, skill and perseverance to stick to business until business sticks to you, get into touch with these business chances. Write to the man or firm named under each address.

INDIANA—at Edwardsville.
Address Mr. Phillip Green, R. D., Georgetown.
NORTH DAKOTA—at Chaseley.
Address F. A. Lester & Son.
KANSAS—at Radium.
Address M. L. Standish & Son.
MISSOURI—at Bogard.
Address Hayer & Day.
MISSOURI—at Coelleda.
Address L. J. Coffed.
NORTH DAKOTA—at Cartwright.
Address Postmaster.
ARKANSAS—at Andrews.
Address W. T. Ray.
KANSAS—at Emmons.
Address W. D. Gish.
KANSAS—at Reno.
Address A. C. Hess.
KENTUCKY—at Dixie.
Address J. M. Cottingham.
KENTUCKY—at Broadville.
Address E. F. Fry.
IOWA—at Slifer.
Address Goughwar Bros.
IOWA—at Sandspring.
Address H. S. Pierce.
MISSOURI—at Excelsior Springs.
Address G. A. Blair.
MISSOURI—at Lagonda.
Address Lagonda Merc. Co.
MISSOURI—at Byberry.
Address E. R. Cordey.
MISSOURI—at Amazonia.
Address J. W. Holcomb.
MISSOURI—at Hereford.
Address Murray & Moore, R. F. D., Hatton.
IOWA—at Buchanan.
Address E. L. Booze.
NORTH DAKOTA—at Nesson.
Address Geo. McKay, P. M.
NORTH DAKOTA—at Oakwood.
Address Alex Gaguer.
NORTH DAKOTA—at Weaver.
Address Geo. Hegland.
PENNSYLVANIA—at Adamsdale.
Address Geo. Adams Estate.
OHIO—at Winchester.
Address W. L. Albert.
OHIO—at Conant.
Address Freman Eby.
IOWA—at Crook.
Address S. B. Lundquist & Son.
NORTH DAKOTA—at Kelso.
Address Postmaster.
NORTH DAKOTA—at Milroy.
Address Jas. E. Bruton.
NORTH DAKOTA—at Bremen.
Address Johnson Bros.
NORTH DAKOTA—at Deisem.
Address Deisem Merc. Co.
MISSOURI—at Oldfield.
Address Jas. Garone.
MISSOURI—at Chilton,
Address Chilton Bros.
MISSOURI—at Germania.
Address F. A. Figge, R. F. D., Queen City.
NORTH DAKOTA—at Burkey.
Address Leon H. Kramer.
NORTH DAKOTA—at Heaton.
Address H. Dell.
IOWA—at Angus.
Address Postmaster.
MISSOURI—at Thompson.
Address J. F. Claussen.
MISSOURI—at Hoflin.
Address Postmaster.
MISSOURI—at Evelyn.
Address D. S. Farmer.



Wants a Boiler Tube Cutter.—I would like information on tube cutting or a plan of a cutter for taking tubes out of a steam boiler. A. E. H. McLARDY, Australia.

A Trio of Questions.—What proportion of brass and block tin is mixed to mould a boxing and which is the best way to proceed?

What speed is necessary to run an emery wheel for saw gumming to obtain the best results?

S. A. HOPPER, Missouri.

A Lame Horse.—Kindly tell me what to do for a horse that goes lame? He stands square on his foot sometimes. The foot is not sore anywhere, and it is not hot, and he gets much worse in muddy weather than in dry weather. He will become lame, get over it and get lame again on the same shoeing. The foot is the natural size.

JAMES STOREY, Pennsylvania.

Shoeing That Forger.—I will try to answer the question of J. Burke & Sons of Ireland on forging. The horse has too much action behind for his front legs and the best method I have ever tried in my forty-six years experience is to shoe the front feet with flat shoes, not heavy and let the heels extend back of the quarters fully the thickness of the shoe. Be sure that the toe of the foot is a little lower, and thicken the heels of the shoes an eighth of an inch.

To shoe the hind feet, just reverse the shoeing, lower the quarters as much as they will stand, set the shoes as far forward as possible and the heels of the shoes no larger than the quarter. Don't thicken the heel on this kind of shoe. I usually use the same weight of shoe both front and hind, as this is sure to slacken the action. WILLIAM ANGLE, Pennsylvania.

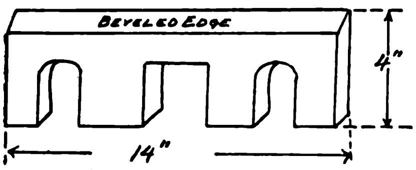
A Kentucky Price List.—I will try to answer Brother Arthur Spaulding in regard to prices in Kentucky. We run a power shop with a Fairbanks-Morse 6 H. P. engine, band saw, boring machine, rip saw, etc. There are three blacksmiths and two wood workers in the shop and we manufacture wagons and sleds and all kinds of farming implements. Our prices are as follows:

4 plain shoes	$ 1.00
Handmade shoes, each	.50
4 shoes, toed	1.40
Filling wagon wheels, each	5.50
Front hound, two horse	4.00
Front hound, four horse	5.50
Tongues, two-horse	2.50
Tongues, four-horse	3.00
Set four buggy tires	2.00
Four wagon tires, two-horse	3.00
Four wagon tires, four-horse	4.00
Four rubber tires, Goodyear	5.00
Four rubber tires, Kelly-Springfield	16.00

VAN CAMP AND BUCHANAN, Kentucky.

The Value of Back Copies.—I have been taking THE AMERICAN BLACKSMITH four years last January. I bound them in book form, one volume to each book and it is very nice, especially when one wants to read the continued articles. I have reread "Plain Machine Work for the Blacksmith," written by Mr. George Cormack, Jr. It is very interesting to me and I would like to see more of this work. I note his reference to future articles in the March, 1911 issue that he has the lathe trued up nicely and in good shape and is going to show how to use it by beginning with plain cylindrical work between the centers. Come on, Brother Cormack with your machine work. I certainly enjoy reading it and have followed your instructions in several instances with success. W. E. ETTER, Missouri

In Reply.—Mr. Cormack has promised to continue his series just as soon as his time permits. His articles on machine work are just the thing for the smith and



TEMPERING PLANER KNIVES

we are just as anxious to continue them as Mr. Etter is to read them. We hope to have the pleasure of continuing these articles in an early issue. [THE EDITOR.]

Tempering Planer Knives.—The engraving shows one of a set of steel planers, size 14 x 4 inches x 5/8 inch thick. I have tried to harden the cutting edge every way known to me and failed to do so and keep the edge straight. There are two in a set that were brought to me to be hardened, as they were too soft. I have bolted it on to heavy iron bar after heating cherry red and put in water, also oil, but they will warp when taken out after cooling. I have also plunged it into slack tub different ways with same results. If possible, kindly give me some information so that I may do the work successfully.

BERNARD SCHICKLING, South Dakota.

In Reply.—The secret of success when heating steel for hardening is even heating. If your knives have been heated hotter on one side than on the other you cannot prevent the warping afterward. The heat must be uniform and the knife must be dipped vertically in the bath and worked up and down, changing its position from one part of the bath to another. You may try warming the contents of the bath to about 100 or 125 degrees. Another way to prevent warping is to place each knife in a tube or pipe about one inch larger than the knife, and pack charred leather between tube and knife. Then heat uniformly until assured that the knife blade is at the proper heat and quench in the warm bath after removing from the tube.

L. H. G., New York.

Die for Welding Sharp Toe Calks.—This die was made from a piece of one-inch steel axle. As it is placed on the anvil as shown it is always out of the way when turning shoes or making the heels.

There is considerable discussion on scientific horseshoeing at the present time. For my part I use steel shoes as light as possible with no calks except on icy roads, thus allowing the frog to reach the ground as nature intended. If my customers wish their horses shod otherwise, I do so. The farmer for instance, usually wants the most for his money; heavy shoes, large nails and long calks, so that they will remain on for at least six months.

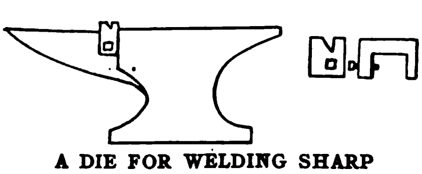
I have been at the trade for forty-three years and have seen many changes in that time and am always learning something new.

J. S. NOYES, Michigan.

An Automatic Grain Wagon.—The engraving shows my Big Four engine 30 H. P. at the drawbar and 60 H. P. on the belt. The automatic grain wagon was built in a blacksmith shop. As a rule the city blacksmiths think all country shops are like Tom Tardy's. We have one Star trip hammer, a large Porter engine screw cutting lathe, a grinding wheel and a dozen small emery wheels for machine work and saw gumming, a 10 H. P. gasoline engine and a 125 electric light dynamo, burning 16 or 30 candlepower lamps.

The automatic grain wagon is just ready to unload 600 bushels of oats in the barn and can be unloaded in 18 minutes. I made all of my own wood patterns for castings for this wagon and all the machine shop work for the blower. It has a force feed into the fans. The blower and fans weigh, with 2¼ inch x 9-foot shaft, 486 pounds and run at a speed of 900 revolutions per minute. The lumber is home-sawed oak and ash and some hard maple. The wagon weight is 4285 pounds.

J. A. L., Minnesota.



A DIE FOR WELDING SHARP TOE CALKS

On the Use of Welding Compounds.—Brother R. A. McGill complains that no one has advised how to use welding compounds. I have used borax and a number of welding compounds, but prefer the "E. Z." After scarfing the ends to be welded, place in fire, scarf side up. Place the compound on the scarf and leave in that position until it is hot enough to stick. Then turn the pieces over and heat and weld in the usual way. Welding plates can be used the same as compounds, but I do not often use them except when welding thin pieces of high carbon steel. Then I prefer riveting plate between the pieces, which has two advantages: Dirt has less chance of getting between, and also you can weld so much quicker, which allows you to weld at a very low heat. Manufacturers of welding plates tell you to place the plate between pieces and wait until it begins to fuse and then weld. Perhaps that would do on heavy pieces, but not on light ones, as they would be cold before it fused. I am like Brother H. N. Pope—cut out those three greasy heats, also eliminate that piece of melted iron and use some good compound or plate.

G. N. SIDDERS, Ohio.

Recommends Cash Business.—I see that some of the craft are writing on the subject of a cash business. I think it will be the best for the customer and the smith, too. If we must give credit, let it be not longer than thirty days. That is about the time our jobber gives us, and as a rule the average smith does not possess enough of this world's goods to wait longer. I believe we would get about as much to do and have more appreciative customers in the end. During my experience I have found that if you give them credit for three or six months and then ask them to settle, they will not like it and you will have to be a diplomat or lose your money and customer, too. Why should the smith wait for his pay? If he expects to remain in business he will have to settle his bills promptly. Isn't he as good as anybody? Isn't his profession as honorable as anybody's? No other laboring class have to drag along for months without their pay, and no other man has to be more prompt in his business than he. The farmer can't wait three months for his broken machine or to have his plow sharpened or his wagon repaired. Then let us be just with ourselves and families and our customers and demand our pay or quit working for such people. I am doing a large amount of new wagon work and find it profitable and pleasant.

J. C. ALLRED, North Carolina.

A Few Kentucky Prices.—I have been in the business only four years, but have done a great deal of different kinds of work, especially shoeing and woodwork and am learning every day.

In reply to Mr. Curtis Spalding's request for Kentucky prices, I submit the following which are the general prices for this section of the country:

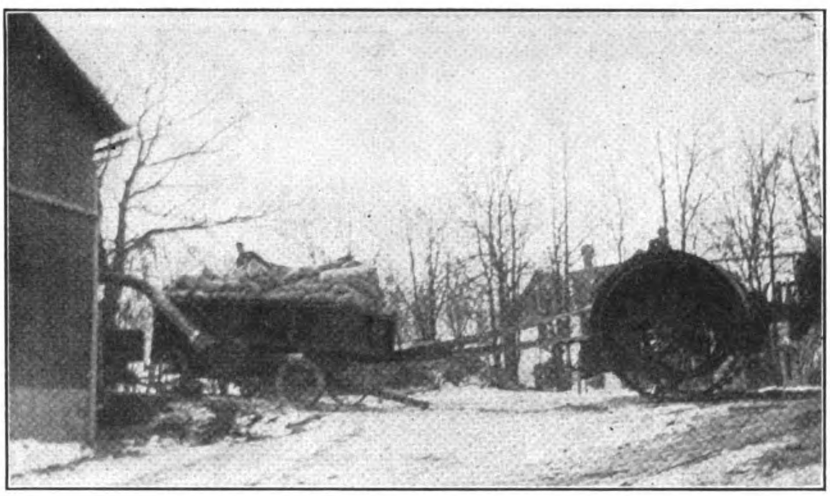
Four shoes, plain	$1.00
Four shoes, toed	1.20
Old shoes, per set of four	$ .60
Odd Jobs (per hour)	.50
Wagon tongue, two hound	1.75
Wagon Tongue, Four Hound	2.00
Welding mower blade	.50
Welding binder blade	.75
Filing mower blade, with sections	1.50
Grinding mower blade	.25
Sharpening plow points	.15
Shovel points, per pair	.15
Setting buggy axle	1.00
One new shaft	1.25
Spoking wagon wheels from	$2.50 to 3.50
Wagon Axles from	2.00 to 3.50
Wagon front hounds	3.00
Wagon hind hounds	2.00
Wagon bed, average	7.00
For cutting down wagon wheels, set of four	8.00
Setting wagon tires, from	$ .50 to .75
Setting buggy tire	.50

I pay fifty cents apiece for wagon tongues, twenty cents for hickory axles in rough, $2.25 per hundred feet for oak wagon stock.

H. O. RIGGIN, Kentucky.

How To Temper Springs.—Brother W. R. K. wants to know how to temper gear springs, etc. Heat the spring to a dark red and dip in oil to cool. Such springs can only be made from the best spring steel. To temper buggy springs, heat just hot enough to blaze the oil, then dip and let cool in the air.

Making Square Links.—Replying to

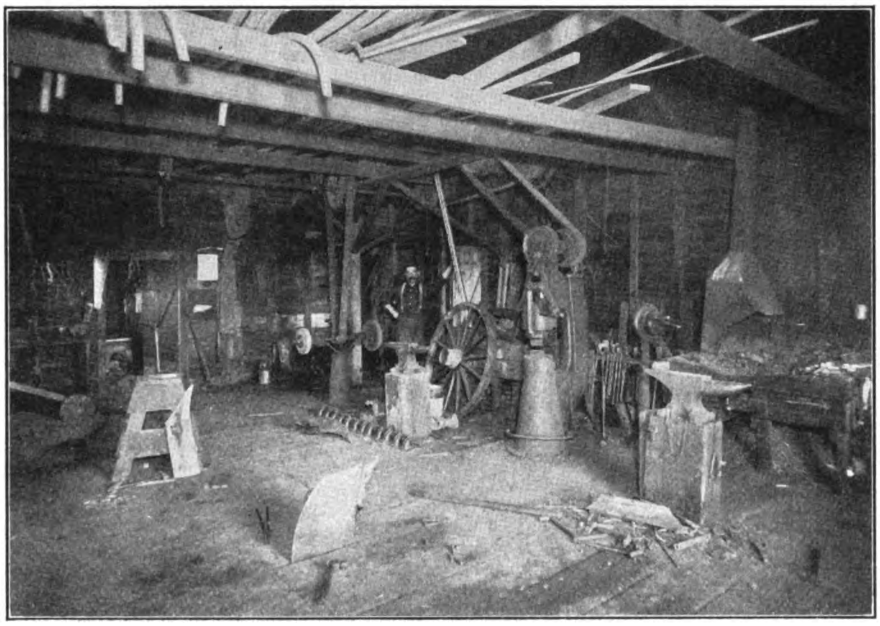


THE GRAIN WAGON IS OPERATED BY A TRACTION ENGINE

Brother Hollingsworth on making ¾ and ⅞ square links, would suggest that he forge a former exactly the size he wants the links. Heat iron white hot. Hold with lever on the end, having the helper pull iron around former, while the smith taps up to fit.

About Tuyere Irons.—In reply to Brother Peterson as to the best tuyere iron, make a six-inch square (or round) box out of boiler iron or pipe, ten inches deep. Confine this to a plate 1¼ inches thick by 8 or 10 inches square. Then cut two holes in center, 1 x 2½ inches apart. Then rivet on slide flanges at bottom to receive plate for cleaning out. Fix this iron in forge four inches below top of forge,—if for light work, three inches will do. The slot holes in thick iron should run parallel with the front of the forge, so the smith can keep them clean if they should get filled with scale, etc. The hole for the blower pipe should be 3½ inches below the top of the box. This tuyere iron will never heat nor choke up. It is the best that I ever used out of a dozen patterns.

W. H. Gunn, Virginia.



A POWER SHOP OF NORTH DAKOTA OPERATED BY MR. A. C. CHRISTENSEN

A Power Shop of North Dakota.—The accompanying engraving shows the power corner of my shop. My shop is 30 x 44. I do all kinds of repair work, wood work, engine repairing, plow work, horseshoeing and automobile work. My equipment includes a 5 H. P. gasoline engine, a power hammer, an emery stand, a power drill, a power blower and a shear. I will give you a few of my prices.

New shoes, 5 and under..........	$ .50
“ “ over 5................	.60
Re-setting, per shoe..............	.35
Bar shoes, per shoe...............	1.00
Hand-turned, per shoe............	1.25
New lay 14 inch, crucible.........	4.00
“ “ 16 “ “	4.25
Pointing and sharpening lay.......	1.00
“ , heeling and sharpening lay	1.75
Sharpening and polishing lay, crucible............................	.50
Sharpening lay breaker..........	.35
Polishing moldboard.............	1.00
Drill shoes sharpened, each........	.30
“ “ plugged and sharpened..	.50
Buggy tires set..................	1.00
New buggy tires, 1 x ¼, set of 4..	8.00
Buggy pole, old irons............	4.00
Buggy reach, straight............	$ 1.50
“ rims.....................	2.00
Setting tires over 2 inches.........	1.00
Wagon pole put in old iron........	4.00
Wagon rims, 1 x ¾..............	2.00
“ “ 3 inches...........	3.00

Other work in proportion to the above.

A. C. Christensen, North Dakota.

An Interesting California Letter On Cold Setters.—I have worked from coast to coast and find some sections where a cold setter is all right—where your wheel is in good shape and the tire is not very loose. But in the San Joaquin Valley where the summers are long, dry and hot, they are getting to be a thing of the past. You see more setters in the scrap pile than in the shop. I have tried most all makes and find one about as good as another, but climate has a great deal to do with tire setting.

Welding Axles is my hobby,—one heat to finish up to two inches, if you have a good upsetter. Cut your scarfs when you cut off the axle. Take a good soft heat (I use Climax Welding Compound) and weld up ½ to ¾-inch long. Now put in the upsetter and shorten up the desired length and you will have a weld that will stand and as neat a job as can be had. If you work rapidly it can be all done and smoothed up nicely in one heat.

Speed Shoers.—We have some speedy horseshoers in this section. One man shoes so fast he can only charge $1.00 a head; afraid that he will get rich. But my shoeing shop is always doing business and my man will only shoe on an average of one horse an hour. I am well satisfied with him and so are my customers.

A Valuable Kink.—A kink I learned when a helper in old Virginia and which I taught a smith of thirty years' experience the other day, may be of interest to other brother craftsmen. It is double tiring. When you put on the outside tire; give it all the draft you want, i. e. if for tire of ¾ thickness, give it one inch draft. Heat it good and hot, drop it over the wheel, and cool off until the weld is entirely cold. Let the rest cool itself, unless it gets the inside tire hot enough to burn felloe. Then sprinkle enough to keep the wood from burning. It will never break at weld and when it comes off you will have to cut it off.

Side Lines.—I have a side line,—wood, coal and farm machinery—which takes up but little of my time, but some easy money is derived from the profits. I have a well-equipped shop, five horsepower electric motor, band saw, drill press, punch and shear, etc. Make a specialty of doing what they want, when they want it, in the way they want it and at the price I want it. Every man gets the same deal. I don't mind having them pass me because my prices are too high, but I don't want them to pass me by for a better grade of work. From a small beginning here I have worked up a good trade.

B. F. Compton, California.

Questions on Smithing and Other Topics.—I would like a receipt for tempering plow mouldboards, axes, edge tools, drill bits, spring steel, such as steel trap, buggy coil, and very light spring steel taps and dies.

What is the best shape to forge drill bits for cutting and standing the work best?

In the January issue, John Engels gave a process of using fish oil for tempering springs, but failed to state how he prepared his steel before tempering and how he managed to secure the right temper with this process.

Is there any good process for tanning calf hides? I wish to re-cover my bellows, but the leather here already manufactured will cost me more than a new bellows.

I will give a simple and easy way of putting skeins on axles that I use. Very nearly all wagon manufactories make their skeins so that when the axle is ready to receive them the axle is perfectly straight on the bottom side, which side I work from. Get a piece of thin board or shingle wide enough to fill up the large end of the skein as far as you want the axle to enter. Lay the board on the axle and mark to trim. I never give any front pitch to axles. This is all right for wheels that have not over ½ or ¾-inch dish.

I noticed that some one gave a plan for taking off and putting on cylinder rings. The following is my method: Take two small wires, double and twist them so as to leave a small loop at one end. Hook the loops over the points of the ring at the lap and open to get on or off. First try the new rings in the cylinder before putting them in the head, as sometimes they are too large and need the ends dressed off. After they are put on head, wrap a small wire around the ring to close it so that it will enter the cylinder.

What makes a good salve or solution for burns?

Would it be advisable to install a band-saw and lathe in a blacksmith shop and what size?

I would like to know what process is used to drill a small hole through a rod so it will be true. For instance, how was the hole made in old rifle barrels?

What is the best preparation to use to solder and the best way to keep the solder iron tinned?

In welding cast steel, is it best to rivet the two pieces together before taking a heat, or heat separately, or is there a better way?

Is there a good receipt for a welding compound? Gritty fine sand and borax is the best I ever found.

I saw in a back number instructions on how to hammer a saw. In case a saw is burnt on the log side, the rim nearest to the burns falls away. I would like to know where the hammer strokes are to be made to straighten the saw in each case. Is it best to leave a slight dish in a saw, or straight? What process is used to temper a burnt saw injured by fire?

What kind of oil is used in welding pipe and tubes?—Sam Howard, Kentucky.

TIMELY TALKS WITH OUR SUBSCRIBERS

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Subscribers should notify us promptly of non-receipt of paper or change of address. In the latter case it is necessary that you give us both the olc and the new address.

Meeting Competition

After a silence of a considerably longer time than we had wished for, our friend and veteran business smith Thornton is with us again. His new series "Meeting Competition" begins in this number. We are certain that these new articles by the writer of the very popular series of "Thornton's Letters" will prove even more valuable and practical to our folks.

Thornton has asked us to invite discussion on any of the matters he writes on, and if any readers have any special problems of competition they would like discussed they are asked to send them to the Editor who will be glad to turn them over to Thornton for discussion.

The Fight For Honesty

Contrary to general belief the fight for honesty is getting easier and slowly but surely the fight against dishonesty in advertising is gaining ground.

When The American Blacksmith printed its first issue there were very few publications guaranteeing the advertisements appearing in their columns. And at that some of the "guarantees" didn't guarantee.

Since the printing of its first number, The American Blacksmith has guaranteed its advertising with a guarantee that says just what it means. And since the inauguration of our Pink Buffalo Stamps the company has been ready at all times to assist readers of "Our Journal" in getting honest treatment from whomsoever they may deal.

And now, after our well-known policy against fraudulent advertising and dishonest business practices has been pursued for over ten years and after many papers have followed our lead, advertising organizations, clubs and associations have taken up the matter.

Among these organizations is the Advertising Men's League of New York. The league has appointed a vigilance committee, which with a competent legal staff and adequate funds is taking up the cudgel against dishonesty in advertising and business. The Associated Advertising Clubs is also pursuing the matter very strongly and "Printer's Ink," a weekly devoted to modern advertising and business has gone so far as to suggest and recommend certain legislation against the dishonest advertisement.

So you see, folks, we are coming, slowly but surely, toward the day of greater honesty and less dishonesty in advertising. And Our Honest Dealings Paragraph and Our Pink Buffalo Stamps are right in the lead of the attacking army.

Contents, May, 1912

It Encircles the Globe—2

(Continued from April)

From South Africa we take a boat for India and here under a blistering sun we find that reading The American Blacksmith is a regular habit with the smiths.

We now journey east to the Philippine Islands where we find more readers of "Our Journal." Then a trip to the south through the Celebes Sea, Molucca Pass, among the Islands of the Banda and Arafura Seas and then down still to the south, through the Coral Sea brings us to Sydney, the second largest city of the great island continent of Australia. We find readers of "Our Journal" in every nook and corner of the Australian States—from Sydney on the east to Perth on the west and from the Gulf of Carpentaria on the north to the Great Australian Bight on the south—we come across readers of The American Blacksmith wherever there's a forge. From Australia we go to Tasmania where there are many more readers of "Our Journal." Thence we journey over to the north and south islands of New Zealand and find The American Blacksmith in a great number of shops. Leaving New Zealand we go north to the Fiji Islands where we find The American Blacksmith not unfamiliar reading.

From Fiji we journey northeast for several days until we come to beautiful Hawaii where the American Eagle now screams. Here we find "Our Journal" in shops that stand beneath beautiful palm trees instead of spreading chestnut trees. From the sunny land of Hawaiian pineapples we go north to the frozen trails of Alaska. Here 'mid snow and ice we find warm friends of The American Blacksmith.

For old time's sake, some of you would now like to follow earlier foot prints made in this corner of the globe—the "Trail to the Klondike." We tramp along the Yukon and when getting into the Dominion and trailing to the southward, familiar names greet our ears—Mackenzie River, Fort Simpson, Peace River and Athabasca.

In the Dominion we find "Our Journal" everywhere—the old French smith of Quebec has it on his desk, the shoer in the Northwestern Mounted Police Service reads it and we find it well read in every province including Newfoundland and Nova Scotia.

(To be continued)

"NEWSBOY" AND "LADY FRANCES", WINNERS OF FIRST PRIZE IN COACH HORSE CLASS, AT MADISON SQUARE GARDEN, NEW YORK CITY

The Causes and Cure of Interfering

E. W. P.

THE causes of interfering are various, but most common is defective conformation of the limbs (see Figs. 1, 2, 3, and 4). Pain in the foot or leg from whatever cause may cause interfering. Overwork and debility are also causes. Only the first cause need concern us here, for when interfering results from debility, overwork, or pain in the foot, the proper remedy is to remove the cause as far as possible. If the cause cannot be removed (as it is in some cases) then protect the injured part with a properly fitting boot.

Now, as to defective conformation: let me say that the conformation of the horse's body and limbs is a study in itself, not easily mastered. In fact, only a horseman with horse sense, a knowledge of mechanics, and a keen eye to proportion can understand it. To be sure, every horse has a body and four legs, but no two horses are exactly alike. Each animal has some peculiarity of its own. The very many varieties of conformation of body and limb, of muscular development and mode of action, makes each animal a little different. Cavalrymen will say of their mounts that some are good to ride, some fair, some bad, and some so rough that to ride them without stirrups would make you see stars.

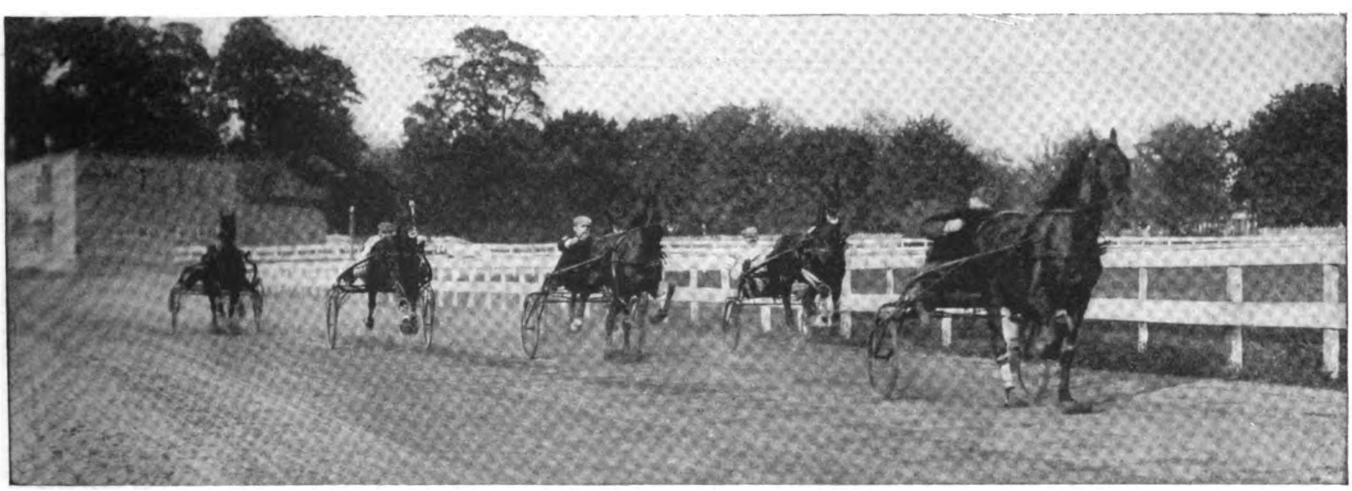
Now let me call your attention to the illustrations, Figs. 1 and 2. These are from life. Fig. 1 shows the legs too close together, while Fig. 2 shows the points of the hocks too close with the feet wide apart (cow-hocked). Both these conformations are prone to interfere. Figs. 3 and 4 are illustrations of front legs. In order to assist the eye to a correct understanding of these illustrations, perpendicular lines have been drawn. Now observe the lines, A, B, C, Fig. 4. You see that while the top of the line A falls from about one-fourth of an inch outside of the right arm, the bottom strikes the outside toe of the hoof. Now observe the line C, falling from about the same distance outside of the left arm. The bottom is about seven-eighths of an inch outside of the hoof. Again, while the right leg, through "calf-kneed," stands square to the chest, the left leg is twisted from the arm to the foot, and is toe-wide also. This animal used to strike the left fetlock with the right hoof and the right knee with the left hoof. This case was cured by leaving the right hoof high on the outside and the left hoof high on the inside, and the use of special shoes as you see him now shod in the picture.

Now take a glance at Fig. 3. Here

"THE HARVESTER" IN ACTION

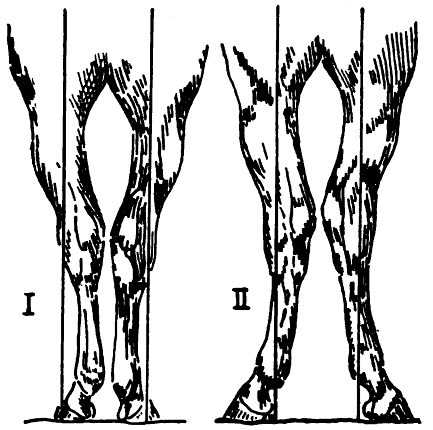
both legs are base-wide and toe-wide, but the right leg is not only set on at a considerable angle to the body, but it is "calf-kneed" also.

When an inexperienced person looks at the feet and legs of a dozen horses



THE ANIMAL HAS BEEN TRAINED FOR MONTHS FOR THIS VERY MOMENT, AND THE SHOER CAN MAKE OR UNMAKE THAT TRAINING

all standing in a row, he does not discern any difference one from another, but the camera will reveal the fact that no two sets of legs are exactly alike. A volume of 200



HIND LEGS TOO CLOSE TOGETHER **HIND LEGS ARE COW-HOCKED**

pages could not contain sufficient pictures to illustrate all the peculiarities in the conformation of body and limb. Some are base-wide; some are wide at the haunches, yet with feet close together; some toe out; some toe in; some front legs are set on square to the chest, others at an angle; some with one leg square to the chest with its fellow at an angle. Some horses have long, oblique pasterns with low heels; some short, upright pasterns and high heels. Some horses have sore tendons (not necessarily enough to cause lameness), and when you cut the heels of their hoofs too low you will probably make them interfere. Some horses have corns and in their endeavor to save the inside heels from concussion they hit the opposite fetlock. Some horses that interfere all round are cured by leaving the outside of the front feet high and the insides on the hind one high, while another is cured by the very opposite process, simply because their legs are not of the same conformation. Some horses that interfere are cured simply by rolling the outside quarter of one foot. The fact is that when you dress the plantar surface of the hoof so as to conform to the set of the limb above it, the animal generally goes clear.

That lowering the inside of the hoof does cure *some horses* is admitted, as lowering the outside will surely suit some others. But to say that there is any set rule for dressing *all feet*, or any system of shoeing that will prevent interfering in *all horses* is an insult to common sense. Each case must be studied separately in an effort to ascertain the cause. And the remedy must mitigate or remove the cause if you are to have success. To look at a set of limbs and determine from their set and movement how they should be dressed and shod, is a branch of the horseshoer's art which is truly scientific and cannot be mastered without careful study combined with much practical experience. It is the same with shoeing as with all things; a study of the case in hand must first be made.

How to Shoe and How Not to Shoe a Horse

F. G. Wright

A horse without good feet is nearly useless, therefore the feet of the horse should be looked after with the greatest of care. To keep the feet in good condition, we must see what nature has done for the horse. In his natural state the horse does not need shoes, nature gave him a tough hoof composed of the shell, the sole and the frog.

The secret of good shoeing is to keep in mind how the wear comes on the feet when the horse is in his natural state. You will see that the sole of the foot is of softer material than the shell and wears away faster which leaves most of the weight and wear to come on the shell and frog. When the shell wears down, the sole gets thin, the foot gets sore and the horse becomes lame and has to be shod. The owner now takes the animal to the shop to be shod. The blacksmith, (not all, but nine-tenths of them) will take a rasp and level the foot up a little and in doing this, he rasps away the shell which is already worn too much and nails the shoe right on the sole which is now sore from the pressure on the ground.

Now the trouble begins. The horse's feet are sore and the shoe is nailed right on the sore spot and keeps irritating it. In a few days the shell grows slightly and the horse travels a little better. He gets along pretty well now for a while, until the shoes either wear out or come off. If the animal goes four or five months before this happens, the owner says the blacksmith is a good one and takes the horse back to him to shoe again.

This time the shell and sole have grown out long, so he rasps off the shell and sole, the shell being the harder it cuts away faster than the sole, so the shoe is again nailed on with most of the weight on the tenderest part of the foot. This treatment causes fever and fever dries out the foot and causes contraction. The horse now becomes lame, the owner takes him to the blacksmith and the smith takes off the shoe, digs around in the foot and finally discovers a red spot in the inside corner or heel. He says it is a corn. He cuts this out, digs a hole up in the sole as far as he dares, puts the shoe on again, leaving the heel a little loose so as to take the bearing off the corn. This is the first thing he has done to relieve the horse.

The horse goes a little better this time and the owner says the blacksmith is a "cracker-jack." By the time the horse needs shoeing again he is as lame as ever. This is a natural consequence as the hole where the corn was dug out has let the shell draw together and causes the corn to be larger. The corn is dug out again and the shoe nailed on again as before, and the horse goes better again. This treatment is kept up right along, the horse gradually grows worse, is finally useless and is traded off to be pounded around by jockies, or is sometimes sent out to pasture

FIG. 3—BASE WIDE FRONT LIMBS WITH TWISTED AND CALF KNEED RIGHT LEG

FIG. 4—CALF KNEED RIGHT LEG, WITH LEFT TWISTED, AND TOE WIDE

to rest up. You will agree with me that this is the course of the horse as shod by nine-tenths of the blacksmiths. But, you ask, how is this to be remedied? The horse must be shod so we can use him. I have told you how nine-tenths of the blacksmiths shoe the horse, now I will tell you how the other tenth shoes him.

As I said before the shoer should keep in mind what nature does. The horse comes to the shop to be shod for the first time. His feet are worn down as before stated, but this blacksmith is very careful not to let the shoe rest on the sole of the foot. The shoe is made big enough to fit the foot, so there is nothing to be cut off, and you will find that the horse goes away from the shop as free as if he had never been lame. When the horse comes back to be shod again, the blacksmith takes care to dress the foot down in good shape, leaving the shell a little longer than the sole and dressing the sole out so as not to let the shoe rest on it. The shoe is made level and not beveled in like a dish which crowds the foot together every time the horse puts his weight on it, but is leveled so as to give the same bearing as he had when he was barefooted. A horse shod in this way with any reasonable care of the feet by the owner, will never have any corns.

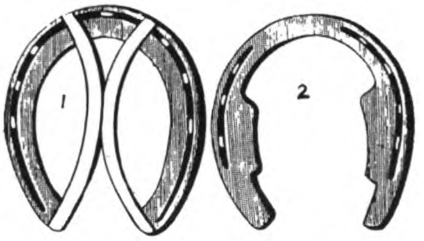
This is the way to shoe a horse with good healthy feet, but when shoeing horses you come across bad feet as well as good ones, and I dare say you will find the bad ones more plentiful than the good ones. So we must study what to do with the bad feet to relieve them.

You will find the contracted feet hard, dry and grown together. They should be dressed down well. This is a hard job which most blacksmiths dislike to do, and so neglect this important part. If there are corns in the feet, do not cut them out by digging a hole in the foot, but dress them down nicely with the rest of the foot, bevel in the shell so the outside is longer than the inside and dressing the heel down so the shoe will not rest too heavily on it. Remember that the red spot you see in the bottom of the foot is not sore at the bottom where you see it, for there are no nerves in the sole, but the trouble is where this blood starts from. The shell has drawn together and squeezed the arteries so the blood could not flow through them freely, so they have become ruptured and the blood works out through the sole where you see the red spot which is called a corn.

Now in putting a shoe on this foot, you must keep this in mind, and bevel the shoe so as to spread the foot when the weight comes onto it. Great care should be taken to get the foot and the shoe beveled the same, and not to let the shoe rest on the sole.

And in this connection, do not forget that the closer you keep the foot to the ground the sooner the foot will recover its normal health. Leave off

"THE HARVESTER", CHAMPION AMERICAN TROTTING STALLION—RECENTLY SOLD TO THE RUSSIAN GOVERNMENT



A STIFLE SHOE AND ALSO A SIDE WEIGHT SHOE

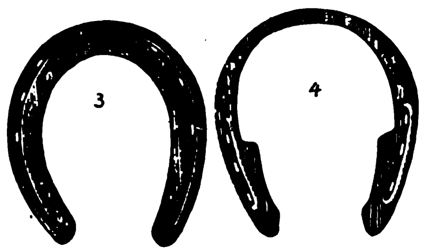
the calks until the foot is back to health and shape again, and even then don't raise the foot very high by means of calks.

Shoeing The Horse Correctly-6

J. C. WEAVER

Special Shoes For Special Cases

It is impossible in the limits of this article to explain all the various shoes that are used and may be used on horses for remedying various defects, correcting different gaits and used for other special cases. All we can do is to show the more generally used shoes, explain their construction and special office and then leave the reader to apply these principles as



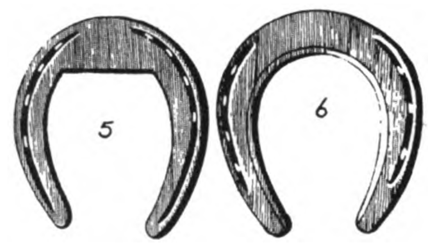
A WELL SHAPED HIND SHOE AND A HEEL WEIGHT SHOE

his own common horse-sense dictates.

And while on the subject of common sense—it is surprising at times what complicated and apparently unsolvable situations succumb to vigorous dosings of common sense. A horse apparently handling his feet in a most unaccountable manner presents a most difficult problem until common sense is applied and then—presto!—we wonder why we didn't see the case as clearly before.

But to return to the matter of shoes—in applying any shoe, whether for a special defect or for an ordinarily healthy, well-shaped foot, don't forget to consider the old shoe and to observe the several matters mentioned in previous chapters in this series. It must also be pointed out that the shoes illustrated and explained cannot always be used and applied exactly as shown here. It may be necessary at times to change the position of the nail holes, the calks or to curve the shoe slightly different. But, these shoes will give you a basis upon which to work. A careful study of the shapes and forms will give you an insight into the principles of shoeing for defective feet.

In the series of engravings, shoe No. 1 is called a stifle shoe by some shoers. The two bars running from the branches of the shoe to the toe are curved so that the shoe presents



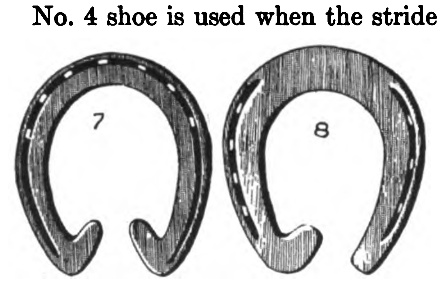
A SHOE WEIGHTED AT THE TOE AND A SNOW SHOE

much the appearance of being on rockers when placed, ground surface down. This shoe when used for stifle difficulties is attached to the healthy foot and not to the diseased foot, the object being to make the animal stand on the stifled foot. This same shoe may also be used to retain packing in the hoof, though this end is more easily accomplished by other methods that are simpler and more easily applied.

Shoe No. 2 is a side weight shoe. It may be used in proper form, of course for either hind or front feet.

No. 3 shows a well-formed hind shoe without any special office to perform, except as a protective armor for the foot.

No. 4 shoe is used when the stride



A DOUBLE HALF BAR SHOE AND ALSO A SINGLE HALF BAR

of the foot is too long, as in the case of forging or striking the front feet with the hind feet. The object of this shoe is to shorten or deaden the stride and to give the front foot a chance to get out of the way of the hind foot. The front shoe in this case should conform as closely as possible to the form of the hoof with as little projecting heel as possible so as to give the hind foot little chance to catch it.

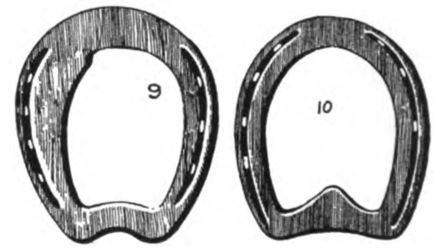
No. 5 is a toe weight shoe. The weight placed at the toe increases the action of the leg, lengthens the stride and with the aid of various shoes and in combination with them, assists in regulating a horse's action.

No. 6 shoe is concaved on the inner edge for the purpose of preventing the balling of snow. This is generally known as a snow-shoe.

The double half-bar shoe at No. 7 is an excellent shoe for corns and weak heels and may also be used with success for contraction. The foot is usually pared perfectly level for this shoe, except at the heels, where the horn is pared down just enough to prevent the shoe from bearing on the quarters.

The single half-bar shoe at No. 8 is good for use on feet with corns on one side only or for quarter crack. The foot should be pared for this shoe similar to the manner of paring for the double half-bar, i. e., no pressure allowed on the quarter over the turned bar.

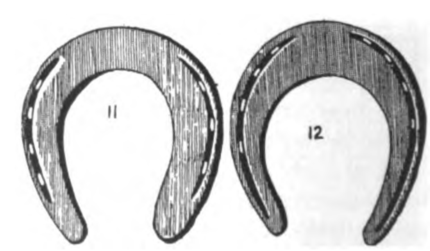
No. 9 illustrates a bar shoe with a side weight. This shoe is for the



A BAR SHOE WITH A SIDE WEIGHT AND ALSO A PLAIN BAR SHOE

horse requiring a bar shoe and also a weighted shoe to correct his interfering.

At No. 10 is shown a plain bar shoe. This shoe with various modifications in the shape, size and form of the bar could be used with considerable benefit to the feet of horses generally. Most shoers don't seem to realize how much a healthy frog has to do with a healthy foot or they would use the bar shoe more frequently. Perhaps the difficulty some experience in making this shoe



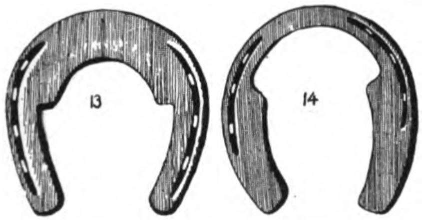
A SIDE WEIGHTED SHOE AND ONE WEIGHTED AT THE TOE

is the real reason for its not being more generally applied.

The shoe at No. 11 is a side weight shoe for the cure of interfering. This difficulty in a horse's gait may be the result of improper shoeing, the position of the limbs or in the use of the animal. Before applying any shoe, the standing position should be very carefully observed, the old shoes examined and then common horse sense applied with the proper shoe.

No. 12 illustrates another style of toe weight shoe. There are many styles of these shoes, all for the same purpose. It is simply a question of using the one you like best and find easiest to make. This one is known as a convex toe weight shoe.

Another style of toe weight is shown at No. 13. It may be well to state here that the weight should be properly proportioned. That is, don't place so much weight at the toe that the horse tires quickly on account of it. Strain is liable to result if too much weight is imposed and while the animal will perhaps travel well



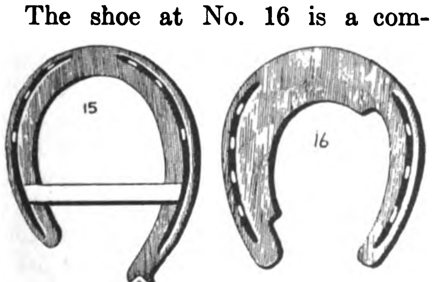
ANOTHER TOE WEIGHT SHOE AND ALSO A HEEL WEIGHT

for short distances at good speed, any considerable travel is likely to result in injury to the leg tendons. Therefore, don't get too ambitious with the toe weight—use it correctly or not at all.

No. 14 is another shoe for shortening the stride. This differs from shoe No. 4 in that it is heavier and the nail holes are all placed well forward.

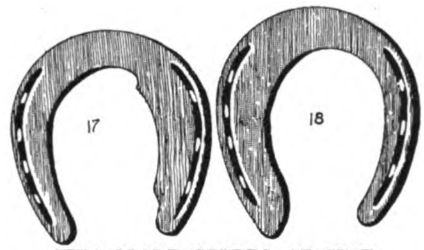
In No. 15 shoe we have a light speed shoe for speeding. This shoe should be made light as possible, consistent with the requirements of the animal.

The shoe at No. 16 is a combined toe and side weight shoe. This piece of foot wear is used to balance the action and is very successful in causing a horse to travel wider and at the same time to increase his knee action. The weight should, of course, be placed on the outer side of the foot.



A LIGHT SHOE FOR SPEEDING AND A COMBINED TOE AND SIDE WEIGHT SHOE

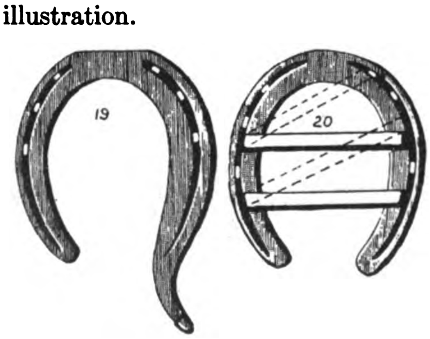
No. 17 shows a simple form of side weight shoe used in case of interfering. The weight on the outer branch of the shoe causes the animal to travel wider—to throw his feet sideways and forward.



TWO MORE STYLES OF SIDE **WEIGHTED SHOES**

The shoe at No. 18 is an old style side weight shoe. It is used the same as the one shown in engraving No. 17.

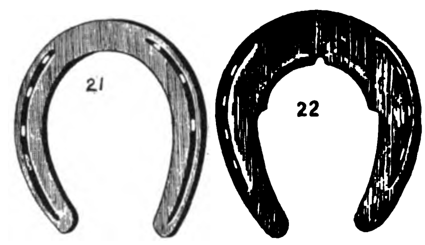
At No. 19 is shown a special shoe to cure cross firing. It is also used in some forms of interfering. The long heel should come on the outside of the foot. This is an excellent shoe to apply on the horse that cross fires. It may sometimes, be necessary to combine the extended heel with a side weight or to give a longer extention to the outside heel branch. The placing of the nail holes may also differ from the shoe shown in the illustration.



A SPECIAL SHOE FOR CROSS-FIRING AND A DOUBLE BAR SPEED SHOE

No. 20 is a double-bar speed shoe usually called the "Memphis." This shoe is used with several modifications, i. e., the cross bars at various distances apart on the shoe proper; in combination with a regular bar shoe and the cross bars are sometimes placed at an angle as shown by the dotted lines. The last mentioned is the case when the animal wears heavily on one side of his shoe.

No. 21 shows a common front shoe well formed, while at No. 22 is shown another toe weight shoe, but rolled at the toe. The office of this shoe is to increase the action and quicken the stride. It causes the foot to break over easily and quickly.

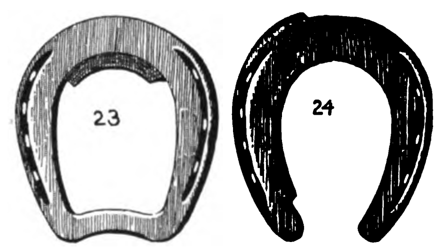


AN ORDINARY WELL FORMED SHOE AND A TOE WEIGHT SHOE

The shoe at No. 23 is a toe weight bar-shoe. This combines the advantages of the bar shoe with the gate regulating qualities of the toe weight. Its form may, of course, be modified to suit the particular case in hand.

The shoe illustrated at No. 24 is an outside weight shoe for some kinds of interfering. It will cause the animal to throw his feet outward and forward.

As mentioned before, all of the shoes illustrated are subject to greater or lesser modifications to fit the particular cases in hand. Some of these changes have been noted, but many others are possible and will be necessary to fit a shoe to a particular use.



A TOE WEIGHT BAR SHOE AND A SHOE FOR INTERFERING

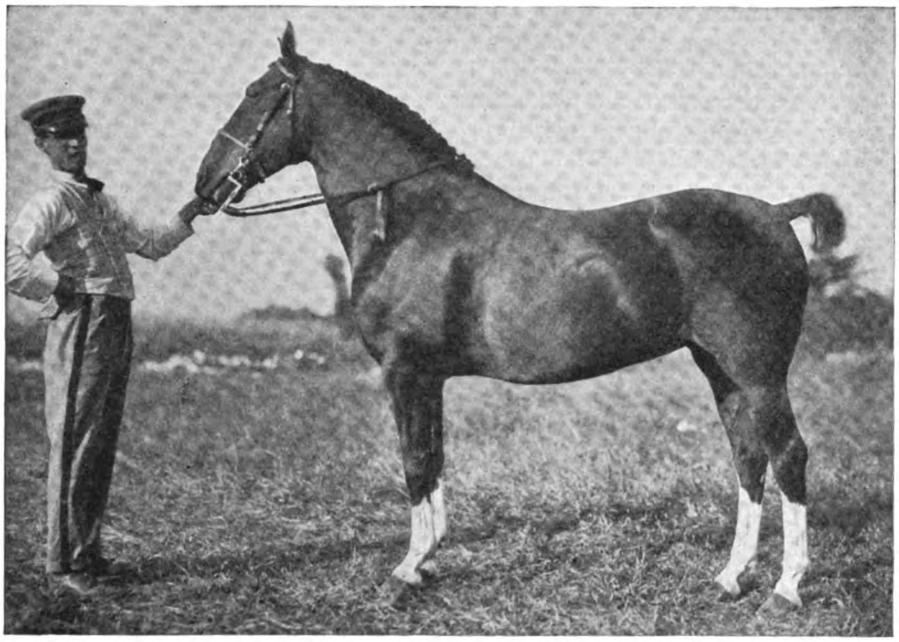
(To be continued)

Some Interesting Facts About the Horseshoeing Craft In South America

Extracts from the Consular Reports

Chile

For the most part the methods of horseshoeing in Chile are primitive and the tools used are simple and few, consisting usually of a hammer, a rasp, a pair of pincers, a crude knife, and an anvil, all of which are made in the country. There is no need of fire, as the workman beats the shoe into shape cold. There are a few shops for some of the better trade

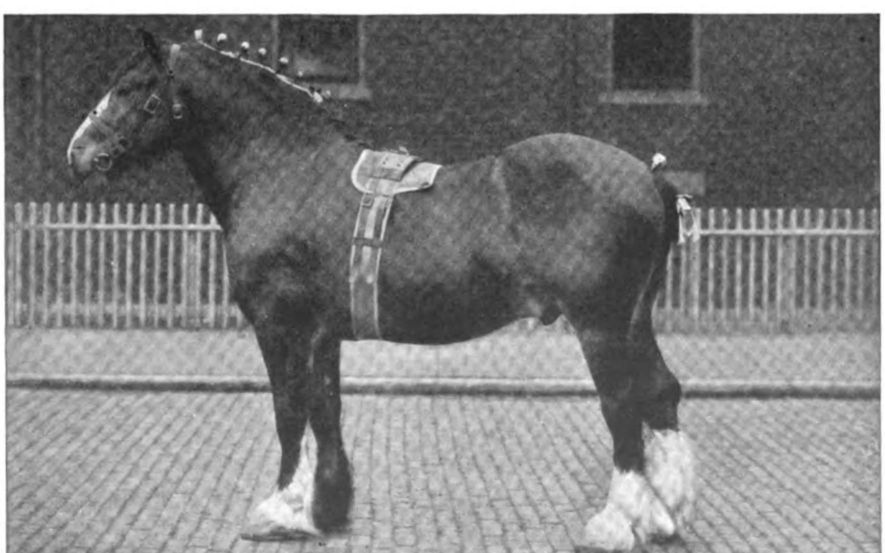


CHAMPION HACKNEY MARE—THIS IS AN EXCELLENT EXAMPLE OF A VERY POPULAR BREED OF SADDLE AND COACH ANIMAL

where more modern methods are observed. The horseshoes are made in the country for the reason that the iron or mild steel enters free of duty, while the shoe pays a heavy duty, making competition with the homemade article out of the question. The nails, the "Star" and the "Crown," the two brands used in this country, are quoted from Sweden and Germany at prices from 40 to 50 per cent lower than from the United States.

Colombia

The blacksmith's tools used are for the greater part of a primitive sort, fashioned by the artisan himself. These crude implements are preferred to modern ones, although German-made tools are gaining in vogue in the larger communities, being selected in preference to those of American manufacture because of their cheapness. The shoes used in Colombia are hand forged, the raw material usually being scrap iron. The same applies to anvils. The bellows are made of native leather and wood. Coal and iron are mined locally in abundant quantities, while the nails are imported almost exclusively from the United Kingdom, primarily because they are marketed in small packages of popular and convenient size suitable for mule transportation.



CLYDESDALE STALLION, INTERNATIONAL CHAMPION FOR 1911. HE IS THREE YEARS OLD AND WEIGHS 1870 POUNDS

Paraguay

Horses go unshod in Paraguay, except in the city of Asuncion, where it is necessary to protect the hoofs from the rough, irregular stones with which the streets are paved. Horseshoeing is carried on principally by Italian farriers. The applicances and tools found in one of the best appearing shops in the city were as follows: Forge, bellows, anvil, fire tongs, wooden mallet, various stamps, cold chisels, nails, hammers, nippers, files, rasps, knives for cutting hoofs and cooling tubs. Horseshoe nails and iron come principally from Buenos Aires. Other materials for horseshoeing are principally English and German.

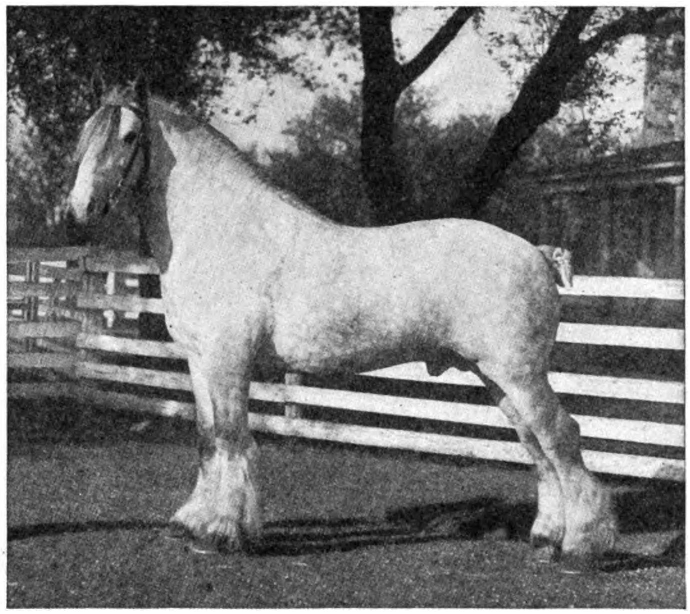
Peru

The workshops of horseshoers and blacksmiths in Peru are of the most primitive kind, the tools used being a portable forge, anvil, hammers, vise, tongs, knives, and chisels. Most of the horseshoes used are made locally, French or Spanish patterns prevailing. Some ready-made American shoes are used. The iron and nails are imported from the United Kingdom and Germany. German forge coal, which is obtained at twelve dollars a ton, is in general use in all workshops. The Peruvian horse generally works unshod, especially riding horses. Carriage horses, which come from Argentina or Chile, are always shod. Mules are generally shod on the fore feet only.

Uruguay

No stock of horseshoes is kept on hand in blacksmith shops in Montevideo, they being made as required. Iron bars of the width and thickness desired are cut into pieces of the proper length, usually six at a time. These pieces are heated and formed into one-half of a shoe, this being done on the anvil by two men with heavy hammers. The holes for the nails are punched as soon as each half of the shoe is formed. When each of the six pieces is formed into half a shoe the other half is then formed. The shoe is fastened with eight nails, four on each side. The nails must have extra hard heads to stand the wear, for the custom here is not to use calks and to allow the heads of the nails to take the wear instead of the shoe. When the nail heads are worn off, the shoe must be replaced. The grooved shoes are much more expensive than the plain.

The tools used in shoeing are a hammer, nippers, a straight piece of steel for cutting the hoof, the trowel-like tool for trimming, and a small block of iron for clinching the nails, all of which are made in the shops. No ready-made shoes are imported, owing to the high tariff duty. A few samples have been imported and are used as patterns. The duty on imported shoes is 36 per cent ad valorem on a valuation of 21 cents per kilo (2.2 pounds) and 36 per cent on a valuation of 26 cents per kilo for horseshoe nails. The duty on iron bars used for making shoes is about 1 cent per kilo. The bars used for making shoes are imported from Belgium and England and are shipped in lengths of about 6 feet. Some are plain iron bars, while others have in them the groove for the nail heads. The nails are imported from Sweden.


A CHAMPION SHIRE STALLION—THREE YEARS OLD, WEIGHS 2250 POUNDS AND VALUED AT $10,000

Venezuela

No modern shops equipped with up-to-date tools are to be found in Venezuela. All horse, mule and donkey shoes are shaped by hand from flat iron bars, the tools employed being such as were used in American shops twenty-five years ago. The shoes, as stated, are imported in the form of iron bars, and there are no ready-made shoes here. Horseshoe nails are imported from the United States and England, but preference is given to the English nail. Coal and coke are principally from England while the charcoal used is burned in the mountains near here.

In the vicinity of Maracaibo horses have never been shod. The local smiths have no tools for this work, and in most cases are ignorant of the fact that metal shoes are put on horses' feet.

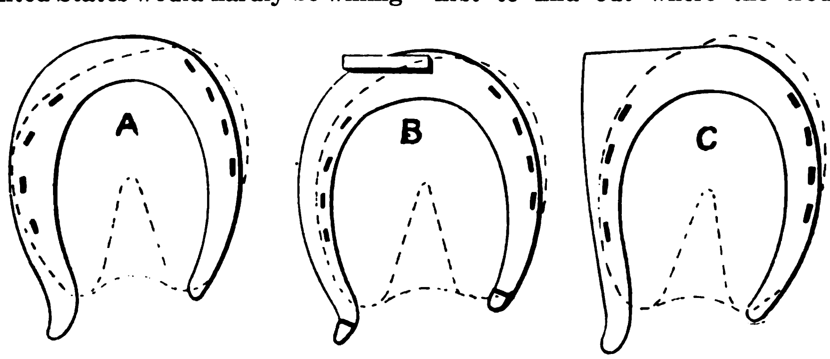
Trinidad

The most common tools are used and just as few as are necessary to accomplish the work. Workmen in a modern well-equipped shop in the United States would hardly be willing to attempt the work if limited to the tools in use here; in fact, much of the work done in the shops in the United States could not be expertly done with such tools. Very little machinery is in use or special instruments to expedite and perfect the work. The shoes are mostly made in the shop by hand, the steel being imported principally from the United States. Machine-made nails are used, also of American make. Rubber shoes are gaining in popularity as they do not slip so easily on the wet macadam and asphalt roads. Calks are not used on the shoes as most of the streets and highways are level. Iron and steel shoes are made by hand; nails, etc., and certain carriage repairs, bolts and screws come largely from the United States. Welsh coal is generally used for the forges.

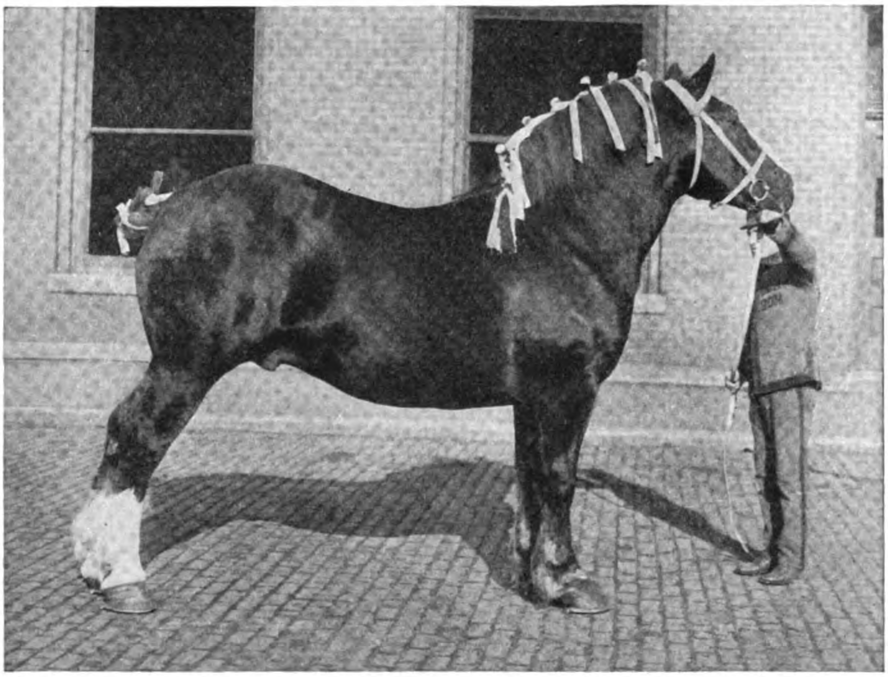
How the Knee-Hitter is Shod

F. G. Barmon

When you get a knee-hitter try first to find out where the trouble lies—if it is in one foot or both feet and whether the animal is perfect in his joints or deformed. If the animal is perfect or reasonably so, examine the foot and shoe. Every knee-hitter wears the outside toe and web of shoe or foot, whether he is base wide or narrow. You have now decided whether the trouble lies in the feet or joints. If it is the foot the case is comparatively easily treated and requires less radical treatment. There are, however many things to observe and consider and the shoer must rely on his judgment and experience. If the foot is long and narrow it should be shortened to the right angle, say 45 or 50 degrees. If the foot is short with very high heels it must be cut down at the heels in order to give it the right angle. Examine the foot to see if it is correctly balanced, i. e., if there is the same width of hoof on each side of the frog or if the inside or outside heels are contracted. This will guide you as to the manner in which to prepare the foot and fit the shoe. Always bear in mind to prepare the foot and fit the shoe in such a manner so that the horse will have equal bearings on each side of the foot. that is, make him wear his shoes level, both heels and webs alike. In cases where the foot is nearly perfect and there is plenty of hoof to work on, a shoe as shown at A in the engraving may be used. The dash line represents the outline of the hoof before being properly prepared. Note the manner in which the shoe is set at the heels. With part of

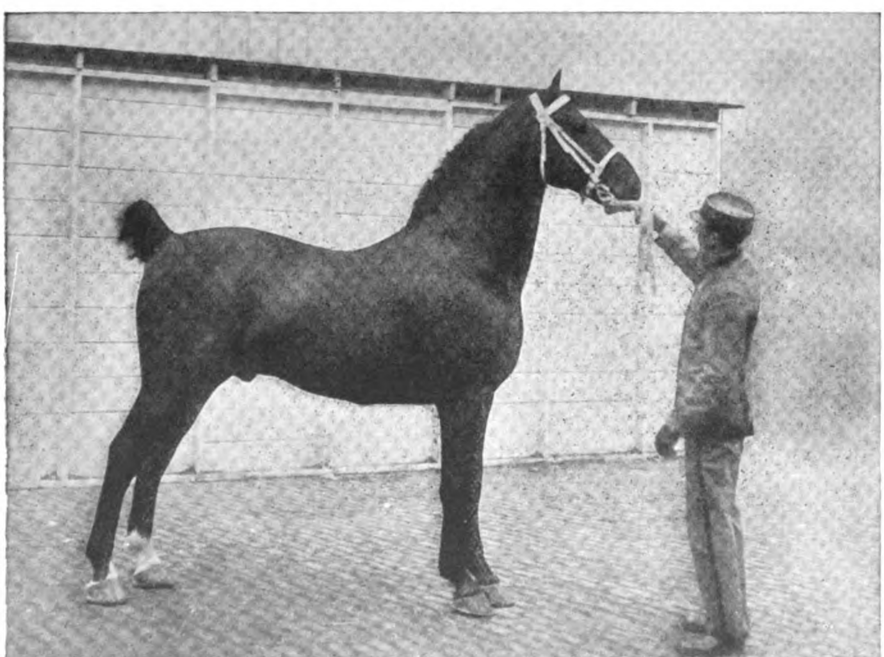


SOME SHOES FOR THE ANIMAL THAT STRIKES ITS KNEES



CHAMPION BELGIAN STALLION—A MAGNIFICENT EXAMPLE OF THIS BREED

the frog, more is accomplished in the manner the shoe is set than in the style of the shoe. In severe cases (such as deformed joints), use the shoe shown at B, with calks. The toe calk is extended according to the severity of the case. A very good shoe when you have not enough hoof to work on is shown at C in the engraving. It is well to keep the heels as wide as possible, as there is then less chance to twist. Do not be discouraged if you don't succeed the first time. Observe and examine closely into the case—sometimes it takes two or three shoeings to effect a cure. Always use as light a shoe as the horse will travel in, as it decreases his knee action. The most difficult are those that hit the ankle, skin and knee, all at the same time. If you make them break off too much on the inside, they will clear the knee and hit the ankle. If they break too much on the outside toe, they will clear the ankle and hit the knee. In such cases I compromise. I use a square toed shoe with good success. My theory in gaiting horses is to prepare the foot and set the shoe (and the style of shoe for each purpose) in such a manner that the foot will be carried in the direction he breaks, regardless of weights.



GERMAN COACH STALLION—CHAMPION AT THE CHICAGO INTERNATIONAL EXPOSITION

Meeting Competition-I

A Series of Talks on Common-Sense Ways of Meeting Both Fair and Unfair Competition

By Thornton

Perhaps the worst kind of competition that the progressive smith shop keeper has to meet, to fight and to conquer is that created by a smith whose ideas regarding profit are ten per cent plus the cost price. Such a man has a mistaken idea of business. And naturally is mistaken about the apparent profit he is making. When approached by his neighbor smith with a suggestion for mutual help and co-operation, he "knows his business" and turns down such an offer emphatically and forever afterward or until he fails, looks upon his would-be helper as a business pirate. There is absolutely no use in attempting to "get together" with a competitor of this type. You cannot tell him a thing about cost keeping or business methods, nor in fact anything else. And, as a rule, you will find this man a poor mechanic and a poor smith.

No doubt many of you recognize one or more of your neighbor smiths in the foregoing description and have perhaps spent many a sleepless night in trying to figure out how to meet the prices quoted by such smiths and still make a profit.

There are several ways of winning trade in competion with such smiths. You will perhaps need to use all of them according to the particular case to be handled, the temperament of the customer and the particular point to be met.

But, before we go any farther in this discussion, let me say a word about quality and quality arguments. I have already said considerable in previous issues about quality. And what I have said has not been simply "talk." When I say talk, shout, advertise and deliver quality I mean just that. Keep pounding on quality. Do you know that hundreds and thousands of dollars are being spent every year by some of the largest business organizations in this country to hammer home the quality idea. If you are located in a city or town of a size to support a number of

stores of one kind, just think if those stores do not stand, in your mind at least, for different merchandising standards. There is at least one that stands for cheap or low prices, another for medium priced goods and at least one stands out strongly as the quality store. You hear folks say: "Yes, so-and-so's are a little higher priced than Cheap and Poor's, but their goods can be depended upon."

Now that quality store's lead is the one you want to follow. The quality smith shop of the town is what you want to aim for. The quality store spends lots of money to hammer home that quality idea in the minds of the people. In everything they do—their advertising, the color and lettering on their wagons, the appearance of their store, the courtesy of clerks and help, and everybody in their business from proprietor to errand boy seems to be inoculated with the quality germ. And that is not an accident, it isn't simply imagination, it is the carefully planned, carefully thought-out policy of the "house."

And when you observe and analyze the literature, the advertising and the doings of such concerns as the American Telegraph and Telephone Company, the Standard Oil Company, the International Harvester Company and numberless other big businesses you will realize that their big aim, the object apparent in everything they do is to impress you with the quality of their goods, their service and their organization.

Just one example in this connection. The International Harvester Company recently published a booklet entitled "The Story of Bread." Of course lots and lots of big companies publish lots and lots of booklets, but this booklet stands out from the crowded shelves of advertising literature because of the big idea behind it. The booklet is excellently printed, excellently illustrated and excellently written. In fact, it deserves a place among the masterpieces of literature. I have read many a book generally considered a near-masterpiece that was not nearly as well written as "The Story of Bread."

And when you get through reading that little booklet and read at the end the name of the International Harvester Company, the only direct reference to them, you are impressed with the bigness and immensity of the bread idea and you cannot help but think quality thoughts of the publishers.

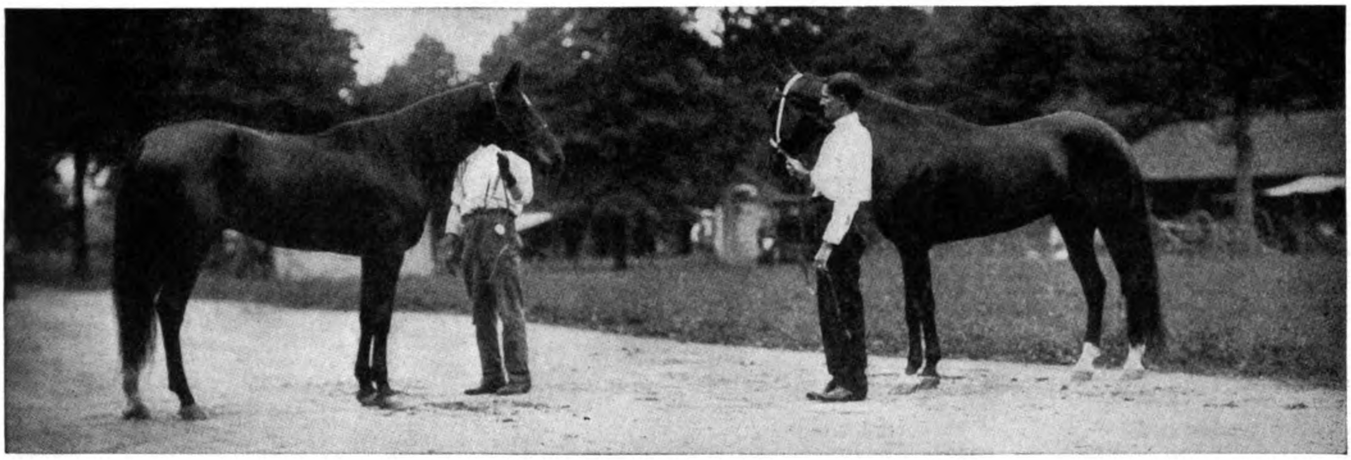
That is just one little example of the importance of quality arguments, the importance given to them by big concerns.

Now, a thing that always impresses me when taking examples of this kind from large business houses, is the big balance in my favor, the big balance in favor of the smaller business man. The big business must necessarily, carry its quality arguments to the people by means of impersonal, unfeeling combinations of paper and ink. You and I and other comparatively small business men meet our customers personally. We can, because of our limited field, instill a personal tone to all our quality arguments and appeals. And if we cannot hammer home our arguments we had best take a course of lessons from the advertisements of these same big concerns.

We have wandered somewhat far from our path in this quality argument matter, but I know that that little sermon won't be lost. I really find difficulty in restraining my pen when I get to writing about quality. There is so much to that subject alone. Some day, perhaps I can get my thoughts on quality sufficiently under control to write a series of articles on that.

But to get back to our subject. When you find yourself lined up against such a competitor as I described talk, advertise and practice quality arguments. Let that be the basis of everything you do. Now let us suppose a customer brings in a repair job. It may be anything at all from a broken wagon wrench to the overhauling of an automobile. When you tell him in answer to the usual question of price, he says: "Why Cheap John gave me a price of (anywhere from ten cents to ten dollars) cheaper." Now don't get mad and tell him to go to Cheap John's. Don't say you don't compete with cheap workmen. Tell the man tactfully, that your price is based upon first class material, and workmanship. Tell him if he wants cheaper work you can give it to him, but that you can't recommend it. Tell him if he is looking at the price, rather than at the work and material you can satisfy him as quickly as your competitor can.

If you have to compete with a price cutter, stock a small supply of cheap materials. Take an example from the modern salesman who carries a few samples of second and third grade goods just to show the buyer the contrast between quality and low price. Let the lowprice customer know that you can slight the work if he wants you to and that the job won't then cost him as much. Show him the difference between



TWO CHAMPIONS: "THE HARVESTER", 2.01, AT THE LEFT, "UHLAN", 1.58¾, AT THE RIGHT

"Forest" and "Second Growth" quality. Show him the difference between the right way and the wrong way of doing a job. Go out of your way to win that man as a quality customer. And if you will persist along these lines, if you will take a personal interest in each case of this kind can you doubt but that sooner or later you will reap a just reward in dollars and cents?

(To be continued)

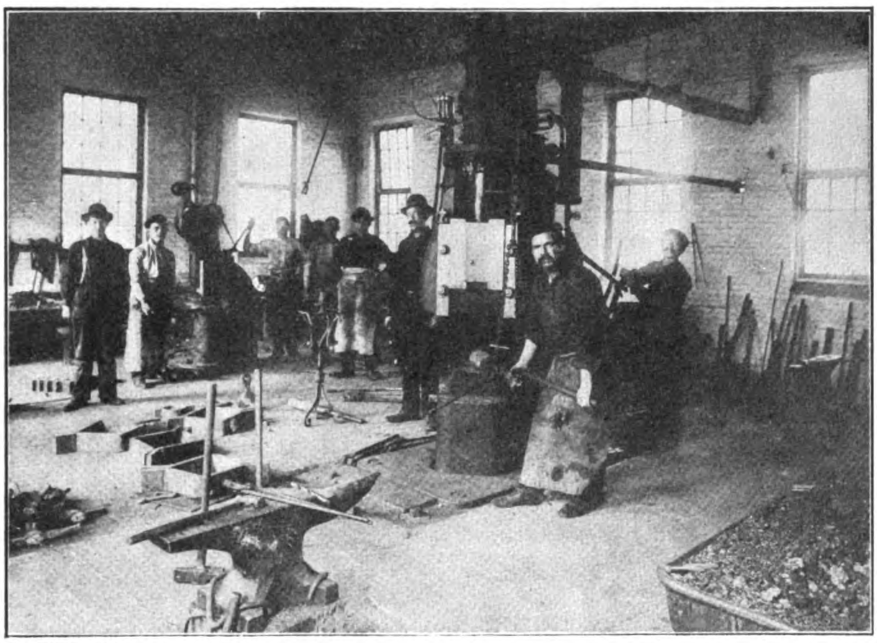
A Blacksmith Shop For Heavy and Light Work

BERT HILLYER

The accompanying engraving shows one corner of our shop. All the men shown, are smiths, well experienced allround mechanics capable of handling all kinds of work that comes to the ordinary blacksmith shop. The man with the hat on standing by the steam hammer is the writer.

We have plenty of light and ventilation. The floor is all concrete. The inside of the shop is white-washed twice a year, every spring and fall, which makes it bright and clean. The shop is also equipped with electric lights for night work, as previously there was a night force employed. Three big double doors and one single door gives us good facilities for handling long work and a narrow gauge track runs up to the door for conveying heavy work. Also have a crane for handling our work on the face plate outside of the shop. In addition we have portable oil burners and a Davis-Bournonville oxy-acetylene welding machine; in fact we have all the necessary tools that makes an up-to-date shop, the small tools, swedges and forms being too numerous to mention.

The way in which we fasten our anvils may interest some readers. This can be seen on one of the anvils in the fore part of the picture. This way holds them securely which is necessary in our class of work. Another thing which I would like to have shown clearly is a coiled spring which runs from the top of crane at the steam hammer. This makes working under the hammer easy and takes off the jar at the same time. If any smith wishes a description of it and how it is made, I will be glad to send it in.



ONE CORNER OF THE SMITH SHOP DESCRIBED BY MR. HILLYER

Numerous smiths can tell of being injured from heavy pieces sliding or rolling off of the steam hammer dies while the piece was being drawn out. This seldom happens with light pieces as the smith has strength enough to control them and keep them where he desires them. But heavy shafts and forgings that are difficult to handle are the ones here particularly referred to. A tool that makes it safe and easy to work with is shown. This is simply a band with two lugs welded on the back as seen in engraving. The band is made to fit one-fourth way down on bottom anvil die and is easily taken off and put on. The band is so easily forged that there is no necessity of telling how it is made. The lugs should stand off at an angle as the end elevation shows. In working pieces they are rolled between the two lugs or can be steadied by them when working lengthways of the anvil die. The hammer smith will see the benefit of this tool.

High-Speed and Vanadium Steels

From *Tool Steel and Its Uses*

By J. C. SCOTT

The superiority of a high-speed steel is probably more easily and quickly demonstrated than is the case with alloy-steels for many other purposes. The speed at which it will turn out the work, the quantity and quality of work turned out in a given time and the condition of the tool at the end of that time are facts that speak for themselves.

The following incident not only illustrates this point, but bears evidence to the remarkable advance in the manufacture of high-speed steel in recent years.

The largest works in the country that makes turned shafting used a tool made of Scott's high-speed steel to reduce a bar $1\frac{1}{2}$ inch round in the rough to $1\frac{7}{16}$ inch. The cutting speed was 225 feet per minute—4 lineal feet of shafting finished per minute. The tool cut 43 lengths of 20-foot shafting (860 feet in all)—all the material of this size at the time wanted—and when taken out was still in first-class shape to use without grinding.

By comparison with the tables given in Mr. F. W. Taylor's book, "The Art of Cutting Metals," one notes that even at so recent a time as the publication of his book a cutting speed of 225 feet per minute would have been regarded as an impossibility on such material.

Furthermore, Mr. Taylor and his contemporaries were so convinced that the life of a cutting tool was, at the best, very short, that they implied, if they did not actually assert, the necessity of ruining the tool and regrinding it frequently in order to maintain a high speed. The incident which we have just quoted, however, shows that a tool made of the right material cannot only be run continuously at tremendous cutting speed, but will turn out a hitherto unbelievable quantity

of work and still be in perfect condition.

The uniformity of this steel and the fact that it requires no special treatment in the blacksmith or machine-shop are other strong arguments in its favor. It cannot be injured by burning and is the strongest high-speed steel made.

Of course, it is possible for carelessness or ignorance to misuse any steel that can be made, but in the case of this steel the liability to serious error is reduced to minimum.

It is strange that any practical man should consider the buying of tool-steel on a price basis only. Increased output and better work are measured in far larger units than the cost of high-speed steel.

Scott's Unique Alloy Steel is specially adapted for chisels, rivet sets, all cupping tools, pneumatic chisels, large engine bolts, piston rods, shafts and automobile work or parts of machinery subject to great torsional strains and vibrations. It has high tensile strength and elastic limit and yet will bend cold, flat on itself, without sign of fracture. It has all of the advantages of alloys containing nickel or chromium and eliminates their well-known disadvantages; as it is neither segregaceous nor pasty and is easily forged and readily machined.

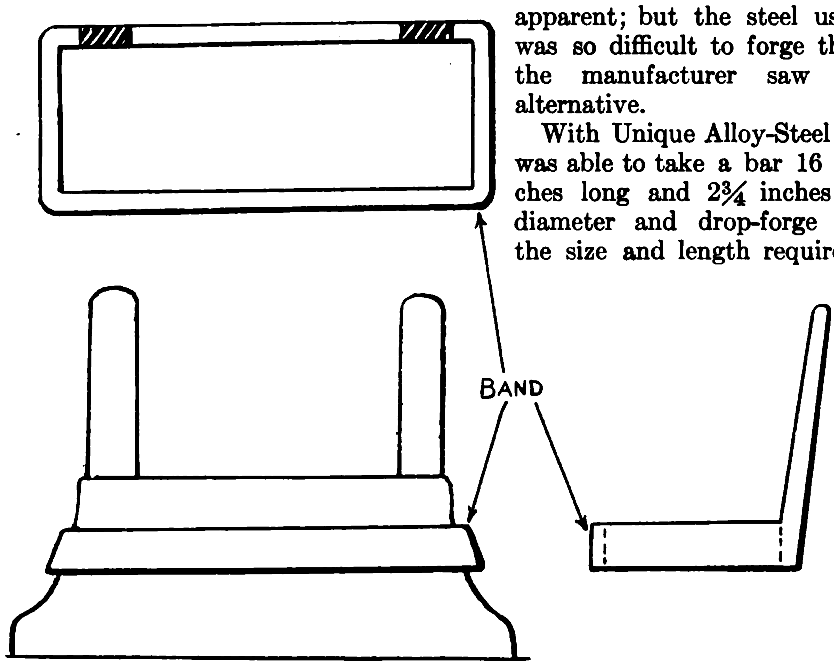
It has another very great advantage over nickel-chrome steel in that it is of far better initial quality, and hence does not require complicated or special heat-treatment.

A nickel-chrome steel is unreliable for most purposes until it has been heat-treated. In this treatment it is necessary to draw it down almost to a flash temper in order to secure the requisite hardness. This must necessarily be at a sacrifice of elongation, which means the practical elimination of the factor of safety as well as much greater difficulty in forging and machining the steel. Unique Alloy-Steel is in many cases used without any heat-treatment whatever. Furthermore, where the heat-treatment is used, the elastic limit and tensile strength increase uniformly and the elongation is sufficient for the steel to bend cold, flat on itself, without fracture.

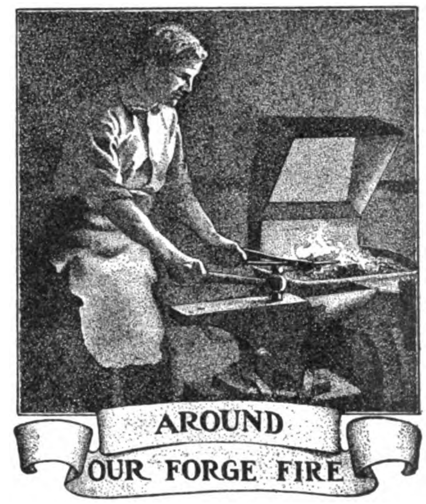
A pair of pneumatic-hammer riveting dies made of this steel and used by the American Shipbuilding Company drove 100,000 one-inch rivets on deck plating before breaking. Up to the time we furnished them with the steel for these dies the best results obtained by them from any other make of steel was 4500 rivets to a die.

The following may also prove of interest: A certain automobile manufacturer had been making shafts which were 32 inches long with a collar or projection at one end 5/8 inch in height. His method was to take a shaft 32 inches long and 2¾ inches in diameter and turn it down to the required size and shape. The enormous waste of this method, both in material and in labor is apparent; but the steel used was so difficult to forge that the manufacturer saw no alternative.

With Unique Alloy-Steel he was able to take a bar 16 inches long and 2¾ inches in diameter and drop-forge to the size and length required. This is a very good illustration of the advantage of using a steel which can be readily forged and possesses sufficient strength for the purpose besides being absolutely uniform in quality.



A SAFETY DEVICE FOR THE POWER HAMMER AND THE STEAM HAMMER



"What becomes of all the old horseshoes?" questioned Benton as he and the Editor finished examining a new set of shoes sent in by Ted Whitney of Rockley. "I've seen piles and piles of shoes in shops, but what becomes of them?"

"Well, the shoer generally sells them to the scrap man and gradually the old shoes, with other old iron and steel, find their way to the foundry." "Perhaps," continued the Editor "the most peculiar use to which old shoes are put is the use made of them in China. Over there the smith uses old horseshoes for making knives and razors. And a peculiar thing is that the old shoes must be of very soft iron or the Chinese smith can't use them."

"Wouldn't be a bad idea to get in touch with the buyers of these old shoes and take a boatload or two over there, would it?" quiried Benton.

"Well, that's what one firm thought one time and so they got a boat full of old horseshoes in Australia and took them over to China. But no matter how badly you want to sell a thing, if the person you want to sell to can't use the thing you want to sell there is usually no sale. And that is what happened in this instance. The Chinese smiths said the iron in the old shoes was too hard and consequently, they couldn't use them. So it's a question of getting iron shoes soft enough so the Chinaman can work the metal."

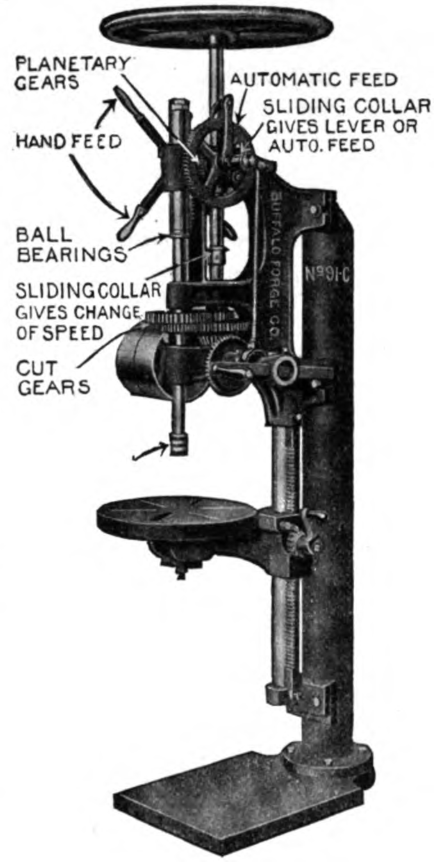
"How do they treat the soft iron in order to make a razor that would be of any use at all?" questioned Benton.

"The razor is first forged from the old shoe stock," began the Editor. "The blade of the razor is forged about two inches long and then it is casehardened. How that casehardening is done, I cannot say. It is probably done in a very primitive way by the smith using some natural chemical element which he can secure without much difficulty."

"That is interesting, but I don't think I should like to shave more than once with such a razor," returned Benton. "It isn't what one could call a safety razor, I imagine."

mportant to Drill Users!

We have recently completed a new series of high-grade drills, abling us to offer a complete family, bearing the numbers from 89 99, which represents the finest selection of blacksmith drills known day. No. 91, shown here, is one of this series. Strength, simplicity d the greatest speed in drilling is the keynote of these designs. An solutely new feature of this machine is that both **speed** and **feed** n be changed by two Sliding Collars, one of which automatically rows in **automatic or lever feed,** as desired, and the other **slow or st speed**—simply give the collar a slight push and the change is ade. No changing of cranks, no turning back of feed wheel. The cond important new feature is the Multi-compound four-arm **lever feed,** very convenient to operate, and unexcelled for fast drilling on light and medium work. Further advantages: **Cut gears, ball bearings,** and **"Suregrip" chuck.** This chuck consists of only two parts — key and collar. The bit is securely locked or released simply by a turn of the hand. There is no set-screw, and no internal threads to strip or cause trouble. It is recognized as the best modern drill chuck on the market. The prices range from $10.00 up to $40.00 on this high-class series, and our smaller drills from a few dollars up.

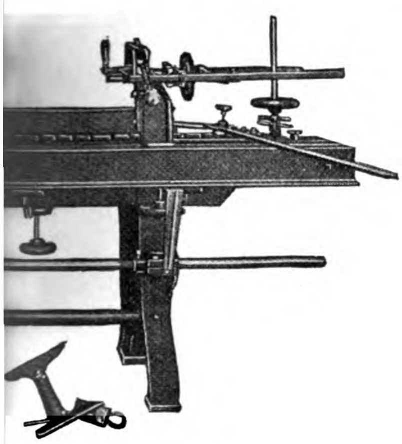


No. 91C

New Buffalo Drill belonging to the Series Nos. 89-99. Drills 1½" hole to center of 22" circle

"Buffalo"

Hand-Power and Electric Drills, Tire Setters, Tire Benders, Punches and Shears



Woodworker

in One

and saw, rip saw, cut-off saw, haper, sizer, spoke equalizer, mber of other operations common sually requiring several machines. ange the tools.

the Blacksmith

naker

Ask for New Catalog No. 145-A

showing the most complete assortment of electric blowers and forges made, also illustrating the drills, forges, blowers, tire benders, tire setters, punches and shears, etc.

Write now and ask for net prices.

No. 680E
Electric Forge

Buffalo Forge Company

Buffalo, N.Y.

Do It Now

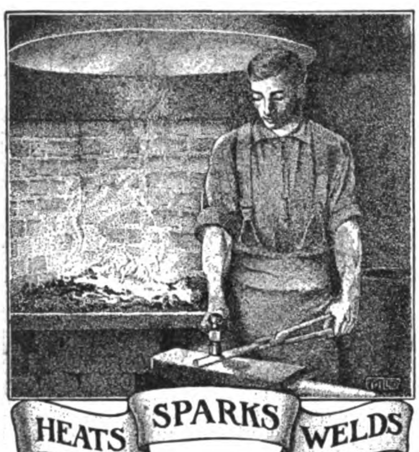
GRACE MARIAN SMITH

The world has need of the doer,
The man whom no hazards dismay;
Who is up and about the world's business
On the ground in advance of the fray.

You can add to the burdens of others,
Or give them a lift on the road.
The problems and troubles are many,
Do you carry your share of the load?

What though there be many another?
Dependable workers are few,
The cause may be lost if you falter,
Press forward! The call is to you.

Don't rest on your faith in your merit,
But prove you can win. Lead the way!
Life waits on no promised achievement—
The time to make good is today.



Keep a' hammerin'—but don't knock.

Hans Dillburger says: "A vord to de vise is unnecessary."

Anyone can cut prices, but it takes brains to cut horse's hoofs.

Make mistakes if you must, but don't respond to encores.

Why call it idle rumor when it is the busiest thing in existance?

Some men are such poor pay they won't even pay attention—to bills.

Time is money only according to how you fill it in.

How about a self-starter on that shop kid? Would he get about any quicker?

You cannot pay for the doctor's visits by return calls when you are well.

Hans Dillburger says: "Yes, but it's de early vorm vat gets caught pi de early pird."

Price may cut some figure on the day of sale, but work and wear cut a figure for days and years to follow.

If a man cannot sleep on account of not being able to pay the doctor's bill, should he go to the doctor for treatment?

Rather less work of a better quality than quantity with less quality. Let that be your guide post to success.

Remember "no foot no horse." And there is no excuse for ignorance in a man's chosen calling.

And all this talk about intensive farming when the smith has practiced intensive heating for centuries.

Don't think that all materials can be equally well ground on one and the same grinding wheel.

Grinding wheels are numbered from coarse to fine and graded from soft to hard; the grade is denoted by letters from E to Z.

Funny that Tom will not tolerate a hole in his trouser pocket and yet allows the holes in his shop roof to get larger every day.

Long time since we've come across a new side-line—a South African reader says he is a raiser and breeder of ostriches, besides running a smith shop.

Save your money by taking advantage of Our Longtime Rates. No reason why you cannot make the saving the same as several thousand of "Our Folks" do.

Ever notice how often the fire occurs right after the policy has lapsed? Don't take any chances with your insurance. Look up your contract right now, if you have any doubts on the date.

Don't think it's none of your business. Inquire about your customer's crops, his health and his family. A little personal interest in his affairs will result in more business interest in your affairs.

Some business comes in of its own accord, some by coaxing and some because you go out and bring it in. But does any of it come in because you don't deserve it? Think it over.

Have you figured on a position on "Our Honor Roll?" Better get busy. It's getting more difficult every day to find a place there. Figure on 1924-25-26 or 27—these are not taken.

Blindfolded may Friend Tardy be for all he knows about the business end of his shop. A few scraps of wrapping paper and a spindle pin comprise his business equipment. "No complicated systems fer me," says Tom.

It will hurt both you and your neighbor. When you think of cutting prices, just put yourself in your competitor's place. It takes a big man to see all sides of a big question, but it will show you that you are doing wrong.

Anything easier than to turn on a switch and the blast at the same time? If you have electricity in your shop, or can get it, you'll find electrical equipment convenient, economical and labor-saving. Try out one machine at a time.

When a man solicits a subscription from you for "Our Journal", or any other journal, ask him to show you his letter of authority. And even then it's best to send your money direct to the office of publication. There are too many fake solicitors to take chances.

Got started with that garden? Better dig up a small plot near the house or shop. Whether you grow vegetables or flowers you'll be better mentally, morally and physically for having gotten closer to God's earth.

There are big changes being made in our craft—how do you think they will affect the business? What is your idea of the automobile and its affect on the smithcraft? How is the combining of smithing and machine shop work going to affect the smith? Let us have your ideas.

The wall space of your shop is valuable—use it for your own advertising. Don't allow every old cigar, cigarette and cheroot maker to paste his signs up. Have some neat signs made for your own business and keep the others off. If the space is worth something to the tobacco maker it's worth more to you because it's your shop.

A side line means extra profit without one cent of extra outlay for rent or taxes, heat, light or other running expense. Get hold of something that you know will sell and then push it between jobs. And when a customer's waiting for a job is an excellent time to talk about something you know he needs and which you sell.

And just think, lots and lots of folks are continually looking around for something "to pass the time away"—to pass away the very substance of life. For without time, if you can imagine it, what have we? Time is the most precious thing we possess—yet it is the freest and most common. Each person has the same amount of it—but like money, the benefits we receive depends upon our use of it. Think it over.

When an iron worker makes a bad job of a piece of wood work, there is an excuse—the man is not working at his trade. When a carpenter tries his hand at shoeing a horse and makes a bad job of it, the same excuse applies. But when a shoer shoes a horse incorrectly, ignorance is no excuse. Make it a business to study your chosen craft as though your life and soul depended upon your knowledge. Don't ever get the idea that you know too much about your chosen craft.

At the Age of 85—Mr. James J. Stoner, a veteran of the craft and for many years a resident of Wurtemburg, Pa., died at his home, April 10th.

When but a boy he learned the blacksmith trade, which vocation he followed through life. Notwithstanding his advanced age he still worked in his shop, and on April 1st he lighted the fire in his forge and did the work he had laid out; and in the evening of that day, as well as the evening of his life, the fire in the forge was smouldering and his work was finished.

Mr. Stoner was a man of unsullied character, a cheerful and loving disposition, which endeared him to all. We have often gone into that shop and grasped that hard, blackened hand and, although black and rough, it was always a grasp that inspired the writer. He was a member of the Wurtemburg M. E. Church and a devout Christian man. F. P.

Our Honor Roll

Mr. Watt Still Leader

Mr. Watt still continues to hold first place with his subscription paid up to December, 1930, and Mr. Stites still holds down the second position.

It isn't necessary to be paid way up in advance to secure a position on Our Honor Roll. Every position and place is an honor position, and there are several years between 1915 and 1930 that are not represented. And there are several months in 1918 for example that are not on the list. Figure on filling in these vacancies. Look over the table of long-time rates and figure out the big saving you can make by placing your name on Our Honor Roll.

	U. S. and Mexico	Canada	Other Countries
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s.

And then, too, you can gain a place on Our Honor Roll by getting new subscribers. Just show this big list of honor readers to your brother craftsmen. A paper must be pretty good to get a practical man's subscription years and years in advance. Then send in the new subscription orders and we will give you six months' credit on your own account for each new order you send us. That will help you toward an honor place. Will you tell your neighbor?

NAME	Subscription Paid to
W. C. Watt, Kan	Dec., 1930
I. J. Stites, N. J	Jan., 1928
W. R. Turner, Man	Oct., 1923
W. Lawson, N. Z	Nov., 1922
A. Pfeiffer, Ohio	Aug., 1922
S. Smith, Tex	Apr., 1922
D. W. Smith, R. I	Mar., 1922
R. H. Keith, Ia	Jan., 1922
O. M. Johnson, Minn	Oct., 1921
H. Feldus, Neb	Sept., 1921
W. K. Kline, Kan	May, 1921
R. S. Crisler, Ky	Jan., 1920
I. M. Townsend, Cal	Apr., 1919
C. Williams, W. Aus	Mar., 1919
T. P. Considine, Mass	Dec., 1918
Richard Brenner, Tex	Feb., 1918
W. F. Hill, N. C	Feb., 1918
P. J. Dally, W. Aus	Jan., 1918
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, N. Dak	Nov., 1917
W. C. Roney, Pa	Oct., 1917
J. N. Miles, Ky	Oct., 1917
H. Ferrel, Ill	Aug., 1917
Yost & Halvorson, Minn	May, 1917
W. McCoy, Kan	May, 1917
E. Thibaudeau, Wis	April, 1917
J. M. Brown, Texas	April, 1917
C. A. Hawkins, Ore	Mar., 1917
A. L. Monycott, W. Va	Mar., 1917
J. Peterson, Ia	Mar., 1917
J. Anderson, Tas	Mar., 1917
A. J. Neill, Vt	Mar., 1917
Ed. Deitrich, Ind	Mar., 1917
Lewis Chase, N. Y	Mar., 1917
E. O. Lee, S. Dak	Mar., 1917
S. Stemple, Ohio	Mar., 1917
R. S. Gugisberg, Kan	Mar., 1917
J. S. Haskell, Col	Mar., 1917
W. L. Roark, Tex	Mar., 1917
Chas. F. Giese, N. Mex	Feb., 1917
M. E. Goller, Pa	Feb., 1917
J Potthoff, Neb	Feb., 1917
G. M. Garett, Mich	Feb., 1917
Ernest Finley, Pa	Feb., 1917
A. Tillman, Cal	Feb., 1917
Walker Bros., N. Z	Feb., 1917
G. W. Whittington, W. Va	Feb., 1917
J. H. Hoyle, S. Africa	Feb., 1917
Irving Bros., N. Y	Feb., 1917
F. Roschy, Pa	Feb., 1917
August Millet, Ill	Feb., 1917
G. A. Gurley, Ore	Jan., 1917
F. K. Wade, Me	Jan., 1917
L. V. Senn, Neb	Jan., 1917
S. H. Austin, N. Y	Jan., 1917
H. Kahl, Ia	Jan., 1917
J. H. Bergen, Kan	Jan., 1917
H. Grimm, Utah	Dec., 1916
A. H. Gooding, S. Aus	Dec., 1916
Leonard Smith, N. J	Dec., 1916
C. F. Shaw, Man	Dec., 1916
W. Elward, Pa	Dec., 1916
W. W. Egly, Pa	Dec., 1916
Jos. Boyer, Mich	Dec., 1916
J. Williams, N. S. Wales	Dec., 1916
J. H. W. Schneider, Cal	Dec., 1916
W. Sauer, Minn	Dec., 1916
F. F. Darling, Cal	Dec., 1916
Chas. Newland, Cal	Dec., 1916
J. T. Brahm, Ia	Dec., 1916
P. H. St. Louis, Wis	Dec., 1916
A. E. Nickols, Okla	Dec., 1916
C. J. Hall, Wash	Dec., 1916
Bob Fricke, Ala	Dec., 1916
Joeris Bros., Tex	Dec., 1916
R. Clemens, Conn	Dec., 1916
Scheffley & Schmitt, Pa	Dec., 1916
A. Brause, Ohio	Dec., 1916
J. E. Beatty, Mo	Dec., 1916
Geo. Cassie, Scot	Dec., 1916
John Kain, Ky	Dec., 1916
F. W. Howell, Ill	Dec., 1916
Tom Nolan, S. Aus	Nov., 1916
H. J. French, N. Z	Nov., 1916
F. N. Browning & Son, Ky	Nov., 1916
J. Macuab, Scotland	Nov., 1916
P. Gessen, Ill	Nov., 1916
J. W. Gribble, S. Aus	Nov., 1916
W. G. Sim, N. Z	Nov., 1916
H. V. Ruehl, Ala	Nov., 1916
G. Lindborg, Ind	Nov., 1916
Pittman Stell, N. C	Nov., 1916
J. S. Finkenbiner, Ind	Nov., 1916
R. D. Wixom, N. Y	Nov., 1916
E. A. Knapp, N. Z	Oct., 1916
T. J. Haskins, N. S. W	Oct., 1916
Lothian & Skinner, N.S.W.	Oct., 1916
W. B. Knouff, Ala	Oct., 1916
Gorham Bros., Ia	Oct., 1916
W. H. F. Brauch, N. C	Oct., 1916
Clark Olds & Co., Neb	Oct., 1916
Irwin Scott, N. Y	Oct., 1916
C. E. Durham, Kan	Oct., 1916
M. Ringo, S. Africa	Oct., 1916
J. J. Iler, N. S. Wales	Sept., 1916
James Poettgen & Co., Mo	Sept., 1916
Jno. Goetzinger, Ia	Sept., 1916
Geo. Fleckenstein, Cal	Sept., 1916
Geo. Hill, Aus	Sept., 1916
E. C. Beard, Aus	Sept., 1916
J. K. Glinicki, Mich	Sept., 1916
Oscar Buhner, Md	Sept., 1916
A. J. Hammond, Cal	Sept., 1916
Robert Murray, Cal	Sept., 1916
D. E. Wright, Pa	Sept., 1916
J. S. Haskell, Col	Sept., 1916
R. Sommer, Aus	Sept., 1916
J. A. Sequin, Can	Aug., 1916
James Clarke, Jr., Aus	Aug., 1916
Dispatch Fdy. Ltd., N. Z	Aug., 1916
C. P. Robertson, S. Africa	Aug., 1916
J. W. Fowler, N. Z	July, 1916
A. C. Lodwig, Cal	July, 1916
A. A. Bahlke, Mich	July, 1916
J. K. Hansen, Aus	July, 1916
J. B. Barker, Ill	July, 1916
H. M. Larsen, Wis	July, 1916
Geo. P. MacIntyre, Me	July, 1916
Jas. A. Buchner, Mich	July, 1916
G. R. Harrison, Aus	June, 1916
J. Waycich, S. Africa	June, 1916
W. Voight, S. Africa	June, 1916
Martin Jensen, Wis	June, 1916
Chester Humbert, Wis	June, 1916
Lincoln Underhill, Cal	June, 1916
M. Broton, N. Dak	June, 1916
Hans Eriksen, Ill	June, 1916
C. Morrell, N. Brunswick	June, 1916
J. O. Conrad, Kan	June, 1916
Adam Schmitt, Mich	June, 1916
James Sinclair, W. Aus	May, 1916
H. Baker, Aus	May, 1916
E. Q. Krehbiel, Kan	May, 1916
C. H. Cairns, N. Y	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vt	May, 1916
C A Stebbins, Kan	May, 1916
Sanford Baker, Mo	May, 1916
P. A. Peterson, Ia	April, 1916
G. F. Bowers, Okla	Apr., 1916
D. E. McDonald, Fla	April, 1916
James Baxter, S. Africa	April, 1916
E. P. Dignan, S. Aus	April, 1916
W. H. Winget, Vt	April, 1916
C. Schmid, Neb	Mar., 1916
A. Rockenschup & Son, La	Mar., 1916
C. H. Alexander, N. Y	Mar., 1916
A. M. Harebo, Wis	Mar., 1916
George Howard, Kan	Mar., 1916
G. N. Follmar, Neb	Mar., 1916
W. Willoughby, Mich	Mar., 1916
H. Hoffmeyer, N. J	Mar., 1916
Frank L. Locke, N. Y	Mar., 1916
Frank L. Evarts, Conn	Mar., 1916
C. R. Winget, Vt	Mar., 1916
H. & J. Chisholm, N. Z	Mar., 1916
C. F. Molkenten, Aus	Mar., 1916
H. D. Phillips, S. Aus	Mar., 1916
A. A. Schreiber, Tex	Feb., 1916
J. T. Dillard, Tex	Feb., 1916
F. J. Flessel, N. Y	Feb., 1916
E. P. Jones, Kan	Feb., 1916
E. J. Bishop, N. Y	Feb., 1916
J. N. Tyler, Ohio	Feb., 1916
Chas. H. Kern, Ill	Jan., 1916
J. H. Ecroyd, Cal	Jan., 1916
Thomas Horne, Ariz	Jan., 1916
Charles Tucker, Mich	Jan., 1916
M Klitgord, N. Y	Jan., 1916
O. Stenning, S. Dak	Jan., 1916
Iver Johnson Arms and Cycle Works, Mass	Jan., 1916
Feldmeyer & Schaake, Kan	Jan., 1916
Chas. Winter, Cal	Dec., 1915
E. J. Bufe, Ia	Dec., 1915
Geo. Sykes, Aus	Dec., 1915
W. Patrick, N. Y	Dec., 1915
Jas. A. Sharp, Mass	Dec., 1915
J. Krahulec, Ill	Dec., 1915
P. E. Dahlfurst, Cal	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Neb	Dec., 1915
G. S. Fisher, Neb	Dec., 1915
Printers Supply Company, Neb	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W.Va	Dec., 1915
C. J. Ash, Kan	Dec., 1915
F. H. Joslin, Mass	Dec., 1915
C. W. Ames, Mass	Dec., 1915
C. L. Sorensen, Neb	Dec., 1915
E. Williams, N. Y	Dec., 1915
W. Urquhart, N. Z	Dec., 1915
W. Rupe, Kan	Dec., 1915
L. S. Kocher, Ia	Dec., 1915
P. W. Frazer, N. Z	Dec., 1915
J. P. Carrick, Ind	Nov., 1915
D. Coderre, Ill	Nov., 1915
F. S. Woody, Ia	Nov., 1915
George H. Ilsley, Mass	Nov., 1915
M. I. Huff, Mo	Nov., 1915
Stephen Wachter, Pa	Nov., 1915
C. J. Willard, Ill	Nov., 1915
J. S. Lee, Wash	Nov., 1915
L. P. Mortensen, Mich	Nov., 1915
W. Foulkes, England	Oct., 1915
N. W. Hammond, Col	Oct., 1915
P. G. Dairdson, N. Dak	Oct., 1915
C. N. Mills, Cal	Oct., 1915
H. Dier, S. Aus	Oct., 1915
S. B. Goodsell, Conn	Oct., 1915
D. F. Hallowell, Ia	Oct., 1915
A. Roth, Ill	Oct., 1915
C. C. Perry, Aus	Oct., 1915
Sidney Stevens Imp. Co., U	Oct., 1915
W. H. Findlay, N. Z	Oct., 1915
R. F. Watson, Cal	Oct., 1915
H. R. Stone, Conn	Oct., 1915
F. Teuber, Ga	Oct., 1915
S. W. Winch, Vt	Sept., 1915
Ed. Hammill, Cal	Sept., 1915
R. D. Simkins, Pa	Sept., 1915
T. J. Reynolds, Pa	Sept., 1915
Wm. Bates, Tex	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, W. Va	Sept., 1915
Hugh L. Lynn, Kentucky	Sept., 1915
Advance Blacksmith Co., Mo	Aug., 1915
A. Chargois, Queens'd, Aus	Aug., 1915
A. M. Byfield, W. Aus	Aug., 1915
C. E. Allen, Neb	Aug., 1915
M. J. Roder, Mont	Aug., 1915
J. E. Lyon, Tex	Aug., 1915
F. W. Krenz, Cal	Aug., 1915
J. W. Storment, Ill	Aug., 1915
Jos. P. Rotolinski, Mass	Aug., 1915
T. O. Chittenden, N. Z	July, 1915
The Goldfields Diamond Drilling Co. Aus	July, 1915
J. A. Lawton & Sons, S.Aus	July, 1915
W. C. Jones, N. C	July, 1915
J. Picotte, Yukon Ter	July, 1915
George M. Ferree, Ut	July, 1915
S. A. Stilles, Ohio	June, 1915
E. L. Herring, Fla	June, 1915
G. R. Twedell, Miss	June, 1915
H. P. Houghton, Ill	June, 1915
J. W. Ivie, Ut	June, 1915
B. A. Parker, Ga	May, 1915
J. C. Klein, Miss	May, 1915
N. B. Demarest, N. J	May, 1915
E. E. Mercer, Kan	May, 1915
Schintgen & Maier, Minn	May, 1915
A. E. Spangberg, Ore	May, 1915
W. S. Helmecke, Tex	May, 1915
F. F. Putnam, Pa	May, 1915
Otto Siebler, Tex	May, 1915
W. A. Matson, Ut	May, 1915
A. Seewalz, Ill	Apr., 1915
E. N. Harris, N. Y	Apr., 1915
W. L. Whitebread, Aus	Apr., 1915
I. P. Chiappa, Bermuda Is.	Apr., 1915
C. Isaacs, Cal	Apr., 1915
P. Himes, Ore	Apr., 1915
D. E. Fish, Ore	Apr., 1915
W. M. McCurdy, Ore	Apr., 1915
C. Schmidt, S. Dak	Apr., 1915
R. E. Bethick, Pa	Apr., 1915
Otto Brandt, Tex	Apr., 1915
Morris & Gezek, Tex	Apr., 1915
C. M. Woodden, S. Dak	Apr., 1915
G. Gartner, N. J	Apr., 1915
John Reeff, N. Dak	Apr., 1915
J. D. Carrico, Ind	Apr., 1915
H. T. Rutter, Pa	Apr., 1915
W. M. Cummins, Pa	Apr., 1915
D. M. Kile, Okla	Apr., 1915
C. W. Brenell, Cal	Apr., 1915
Geo. Vandersee, Ore	Apr., 1915
H. H. Berry, Fla	Apr., 1915
A. C. Frizzle, Mass	Mar., 1915
M. Falstor, Ia	Mar., 1915
Aug. Montrey, N. J	Mar., 1915
C. P. Sharp, N. Y	Mar., 1915
N. Smedbron, Wis	Mar., 1915
E. H. Liebenstein, Wis	Mar., 1915
J. L. Horan, N. Y	Mar., 1915
A. G. Wolcott, Ohio	Mar., 1915
M. C. Harned, Tenn	Mar., 1915
E. Ankerman, Ohio	Mar., 1915
J. R. Shoop, Okla	Mar., 1915
J. Folsing, N. Y	Mar., 1915
H. Schop, Wis	Mar., 1915
W. D. Oliver, Ont	Mar., 1915
Trupke & Goetter, Wis	Mar., 1915
B J. Herrick, Wis	Mar., 1915
Z. M. Wesley, Ark	Mar., 1915
C. Vogel, Neb	Mar., 1915
J. J. Casey, Nev	Mar., 1915
T. Frazier, N. J	Mar., 1915
T. Beatty, N. J	Mar., 1915
W. A. Lippincott, N. J	Mar., 1915
G. R. Boggs, Ala	Mar., 1915
J. H. Helmes, Cal	Mar., 1915
R. Yuill, Ill	Mar., 1915
J. Marshall, Ind	Mar., 1915
W. A. Connor, Ind	Mar., 1915
C. Lagola, Ohio	Mar., 1915
J. J. Purington, Ohio	Mar., 1915
E. B. Downey, Ohio	Mar., 1915
C. D. Camp, N. Y	Mar., 1915
G. W. Blakey, Okla	Mar., 1915
E. S. Sheets, Pa	Mar., 1915
J. E. Johnson, Pa	Mar., 1915
Van Den Wildenberg Brothers, Wis	Mar., 1915
V. Priessnitz, Wis	Mar., 1915
F. J. Ties, Wis	Mar., 1915
T. E. Birchmore, Ga	Mar., 1915
L. A. Campbell, Ia	Mar., 1915
J. J. H. Fieriks, Minn	Mar., 1915
J. Hiemanz, Minn	Mar., 1915
J. L. Schurte, Mo	Mar., 1915
University of Tennessee, Tennessee	Mar., 1915
A. Thalman, Tennessee	Mar., 1915
S. Martin, Texas	Mar., 1915
R. L. Killingsworth, Tex	Mar., 1915
W. H. Leonard, Pa	Mar., 1915
W. A. Shive, Pa	Mar., 1915
R. J. McLaren, Aris	Mar., 1915
A. Murphy, Idaho	Mar., 1915
J. F. Prater, N. Y	Mar., 1915
Thoreson & Stock, Wis	Mar., 1915
C. Finzer, N. Y	Mar., 1915
W. E. Bedford, N. W. Ter	Mar., 1915
R. Armstrong, Ont	Mar., 1915
J. T. Hines, Va	Mar., 1915
T. W. Beall, W. Va	Mar., 1915
W. Kennedy, Ohio	Feb., 1915
G. E. Bently, Kans	Feb., 1915
I. Blough, Pa	Feb., 1915
C. S. Nelson, Utah	Feb., 1915
P. O. Wallin, Minn	Feb., 1915
J. H. Wildey, Pa	Feb., 1915
J. F. Leiss, N. J	Feb., 1915
L. E. Lacy, N. Y	Feb., 1915
O. Coneaux, La	Feb., 1915
J. H. Lomgley, Mass	Feb., 1915
J. W. Faulk & Son, Ala	Feb., 1915
P. F. Marcotte, Cal	Feb., 1915
L. Lau, Ill	Feb., 1915
A. L. Erickson, Ill	Feb., 1915
Joseph Kuhl, Ill	Feb., 1915
F. Pietzschke, Mo	Feb., 1915
W. Monk, Ohio	Feb., 1915
J. P. Maw, N. Y	Feb., 1915
H. T. Palmer, Pa	Feb., 1915

Ten Questions For the Month

Inasmuch as shoeing and horse anatomy receive special attention this month, it is thought best to devote our questions to these subjects.

1—Which are best for the health of the horse's feet, high or low calks? And why?

2—Should the shoe be fitted to the hoof or the hoof to the shoe?

3—What is the office of the toe weighted shoe?

4—What is the object of the bar-shoe?

5—What should be the great object of the shoer when shoeing a colt?

6—What is the rolling motion shoe used for?

7—Locate the os coronae?

8—What is the common name of the os coronae?

9—Should a shoe be fitted hot or cold to secure the proper bearing surface?

10—What are the uses of clips on shoes?

These questions and answers are meeting with the approval of our folks and many letters of praise have been received asking that this new feature be continued regularly. So until further notice, we expect to make this department a regular thing.

Answers To Questions in April Issue

1—A split lock washer may be used. A lock nut or a string may be bound round the bolt between the nut and the part the nut bears against and the nut then fastened down or the nut and bolt may be drilled and a small pin inserted. There are numerous other ways in use that are more or less complicated.

2—Carbon deposit can be removed by taking the pistons out of the cylinders and scraping the deposit off or kerosene may be injected freely into the cylinders and the engine operated until cleaned or a small chain may be dropped into each cylinder and the engine allowed to run for a few minutes until the carbon is dislodged.

3—Gaskets for use where oil, gasoline or great heat is present should not have any rubber used in their makeup. A combination of copper and asbestos is best suited for joints likely to be subjected to heat. For oil and gasoline joints, gaskets of leather, wood fibre and heavy tough paper are suitable.

4—If the front wheels are not parallel the tires will receive a sliding side motion beside the rolling motion, thus increasing the wear on the tires to a great extent.

5—The balls must be exactly the same size and truely and exactly spherical.

6—Remove the valve and apply a small quantity of emery and thick grease to the bearing surface. Now replace the valve and rotate the valve with a screw driver or valve grinding tool occasionally lifting the valve to a new position and again rotating. If the valve is an inlet valve it is well to stop the opening with a piece of waste so that none of the grinding mixture can enter the cylinder. An excellent mixture for grinding valves may be made by mixing fine emery powder and vaseline.

7—A broken rod may be repaired by shrinking a tube on the two ends or three pieces of steel may be bound to the broken ends by windings of wire or the straight pieces may be held by shringing onto them rings of steel. It is not best to drill into the ends of the broken pieces and insert a plug. Better to add to the metal already present in the rod, then to weaken it by drilling.

8—The crack may be rusted if it is simply a crack. A solution of sal-ammoniac is suitable for this purpose. The liquid is poured into the jacket, air pressure applied with an air pump and the jacket allowed to lay with crack down for several hours. If the crack is open it may be repaired with iron cement or it may be drilled and tapped and a succession of iron plugs inserted.

9—A hole may be drilled in the end of the stem and a pin inserted. Or if the stem lacks very little of being long enough a thimble or cap may be shrunk on the end of the stem.

10—An easy way is to fill the ball case with thick grease just before the case is open far enough to let the balls drop out. When replacing the balls, fill case again with the grease and place balls into the thick material.

A Knocker of an Advertisement

The following is an advertisement that was run in a local paper by one of our Texas folks. This surely ought to knock up some business for the knocker. The ad is certainly original and Mr. Hewitt should be complimented upon this novelty.

I Am a Knocker

I am a busy knocker and knocking is my business. I knock to live and live to knock. When I knock I do not use a muffled or pneumatic hammer, but use one of solid steel from three-fourths of a pound to a pile-driver. I knock while the iron is hot. The sound of my hammer rings so clear that it has been heard all over Williamson, Brazos, Burleson, Bexar, Dallas and Tom Green counties. I never knock around the streets except when I am smoking or collecting chips I have knocked off. I do not like knocking, but got the habit when I was a boy and it has become so fixed upon me I cannot break the habit. I have become so expert at knocking that I can knock the broken parts of steel or iron together that have been broken, knock an edge on a plow, knock shoes on horses, knock the set-back in an axle that was knocked out on a telephone pole, knock buggy springs in shape that have happened to accidents that cannot be explained. When I set an axle I do not burn the paint off, loose the washers, and skin the buggy up otherwise. I set tires without dishing the wheels out of shape. No cold process for me. I repair and paint buggies, wagons, plows and bicycles.

If there is anything I have left out just ask me about it. I am so absent-minded I forget, or rather I get my head so full of ideas that I overlook important things.

Next time you have business in my line, remember I want the job. All of the above is true to the best of my knowledge and belief.

Respectfully,
M. S. Hewitt.

P. S.—I would thank the public for their patronage and favors last year, but those who patronized me know I am thankful, for I told them

so, and I got one or two balling-outs for which I am not thankful, and again, somebody may read this ad that has never spent a cent with me. I am thankful to those who patronize me. I am, sure enough.

HEWITT.

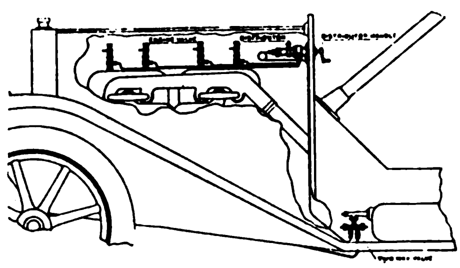
Operation and Repair of Self-Starters—2

HAROLD WHITING SLAUSON

Another self-starter which is being used successfully on a number of cars is the electric type. It is only on the higher-priced cars, however, that the repair man is liable to encounter this type, for the system requires the use of comparatively expensive parts that the makers could hardly afford to furnish on a car selling for less than, say $1500 or $1800. On cars provided with an electric lighting system, however, the electric starter is the logical type, for the same current may be used for running both.

The repair man familiar with the construction and repair of a magneto will find a somewhat different principle employed in the application of the electric current to the self-starter. The current generated by a magneto cannot be used in connection with the operation of electric lights or the self-starter, unless the magneto is of the direct-current type. As has been explained in a previous article, however, the ordinary gear-driven magneto generates alternating current, and consequently a small dynamo is used as a part of the self-starting and electric lighting equipment of many of the 1912 cars.

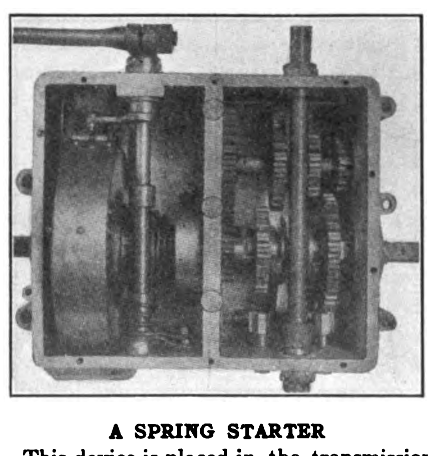
When the dynamo is driven by the engine of the automobile, it generates direct-current, which can be used to charge a storage battery. If, now the current from the storage battery is turned back into the dynamo, the latter immediately becomes an electric motor and will drive anything to which it is properly geared. Thus, the same instrument is used for generating electric current and for starting the gasoline engine. In some systems, the current generated by this dynamo is used for the ignition in the cylinders, as well as for lighting the car, and thus the instrument sometimes replaces the magneto. When used as a dynamo, the machine is generally driven by the pump shaft of the engine, or by the shaft on which the magneto would ordinarily be mounted. When the dynamo becomes an electric motor for starting the engine, however, a greater gear reduction must be employed so that sufficient power can be applied to the crank shaft of the engine, and consequently teeth are often cut on the outside of the flywheel with which a small pinion mounted on the end of the armature shaft meshes. Inasmuch as the flywheel is large and the pinion is small, a high gear reduction is obtained that enables the low power of the electric motor to turn over the engine, even against the heaviest compression.



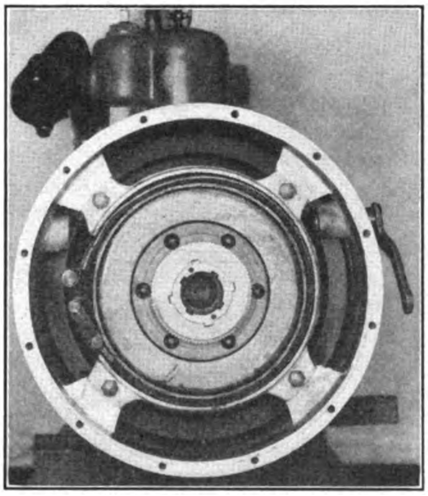
AN ACETYLENE STARTER
Here are shown the tank, the piping and the distributing arrangement.

By the movement of a pedal or lever located at the driver's seat, the armature is disconnected from its driving shaft at the same time that the pinion is slid into mesh with the teeth on the flywheel. Then, by turning a switch, current from the storage battery is sent through the electric motor and the gasoline engine will be run through the gear connection just described. With the majority of such systems, the storage battery is made of sufficient capacity to operate the engine under these conditions for twenty minutes, or more, depending upon the load. Although the self-starter is designed only to be used when the main clutch is disengaged and the engine can run free, it may be employed to run the car for a half mile, or more, in an emergency. If the repair man has occasion to disturb the armature shaft of the dynamo, or its gears, he must make certain, in replacing them, that the driving shaft clutch will be disengaged before the pinion begins to mesh with the teeth on the flywheel. Inasmuch as the distributer for the ignition system is not a part of the dynamo—as is the case with the magneto—it is not necessary to observe the same care in "timing" the armature of the dynamo. In fact, the timer and distributer system are entirely independent of the armature of the dynamo.

If a separate magneto is not used and the dynamo is employed for the ignition as well as for the operation of the self-starter and the lights, the current will probably be taken from the storage battery at slow speeds of the engine. This necessitates the use of an automatic switch which connects the ignition circuit with the battery when the dynamo is driven at so slow a speed that sufficient current for ignition will not be formed. The battery is kept automatically charged at all times by the current that is delivered to it by the dynamo at high speeds of the engine. When the engine is run slowly, however, the current from the battery will be greater than that generated by the dynamo and consequently another automatic device must be used to prevent the flow of electricity back from the battery to the dynamo. This is known as the "cut-out," and



A SPRING STARTER
This device is placed in the transmission case. The brake band which releases the spring is clearly shown.



A SPRING SELF-STARTER

This is included in the flywheel. The outer brake band releases the spring when it is desired to start the motor. The winding and starting clutch is in the center.

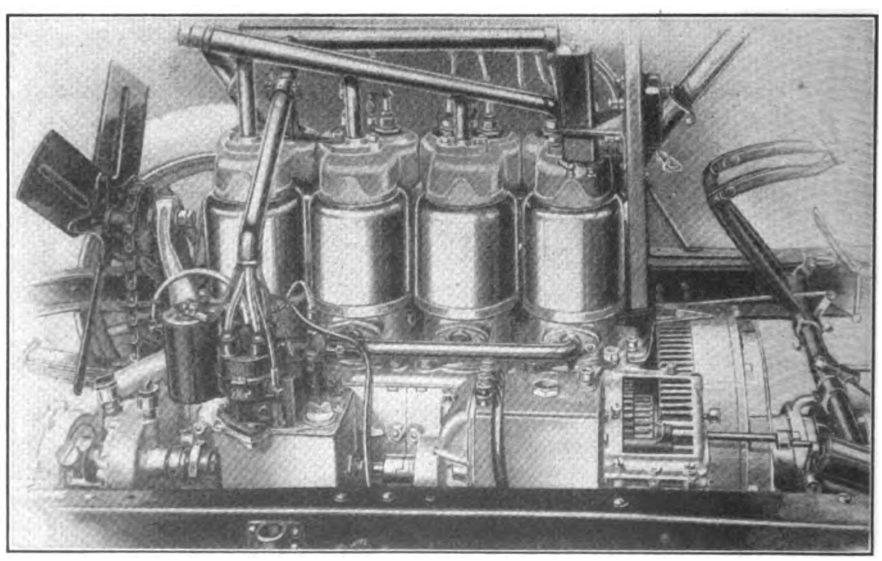
is in reality an electric check valve that generally operates on the magnetic or electric resistance principle. This, also prevents the battery from becoming overcharged at high speeds of the dynamo.

The construction and operation of these automatic electric switches and cut-outs are best understood by an electrician and it is advised that the machinist or repairman have as little to do with them as possible. Their interior construction, however, seldom requires attention and while it is well that the repairman should know what purpose each part serves, he need bother himself only about the connections. If it is necessary that any of the electrical apparatus should be removed in the repair of an engine, each connection should be marked so that there can be no mistake in replacing the wires. This is of the utmost importance. Trouble with an electric self-starter will probably be due to loose terminals or poor connections. The terminal of each wire should be closely examined and the connectors securely soldered in place if there is evidence of the slightest looseness. Before this soldering is done, the bare ends of both wire and connector should be scraped clean. All wires should be protected from gasoline and grease and should be held in such a position that there will be no possibility of chafing that will wear off the insulation and result in a short circuit.

The "explosion," or the "ignition," starter is probably the simplest of all to apply to an engine not already so equipped. Every automobilist knows how a four or six-cylinder engine will often "start on the spark" merely by the movement of the timer lever. A motor will start in this manner because an explosive charge has been left in one or more of the cylinders when the engine was last stopped, and such charge is ready for ignition as soon as the spark is formed in that cylinder. After the motor has cooled, this charge will gradually escape, and for this reason, an engine that has been left standing over night, or for several hours, will not "start on the spark." The ignition type of starter relies for its successful operation on its ability to introduce an explosive charge in the cylinders which will be ready to ignite as soon as the current is switched on. The explosive charge is either gasoline vapor obtained from the carburetor, or acetylene gas secured from a storage tank similar to that used for operating the acetylene lights. The last-mentioned type, in a variety of styles, is in the most general use.

A gas such as gasoline vapor or acetylene, must be mixed with a certain proportion of air before it will be rendered explosive. The proportion of air to acetylene gas may vary between wide limits and still result in an explosive mixture, while gasoline vapor must be combined with about nine times its volume of air in order to be rendered explosive. The ordinary type of explosion starter consists of an acetylene storage tank (which may be the lighting tank), a dashboard control valve and distributer connected with the tank, and an individual pipe in which is located a check valve, leading from the distributer to each cylinder. With the majority of such systems, each cylinder is filled with an explosive acetylene charge before the current is switched on, and thus four or six impulses will be delivered to the motor with the one operation.

The acetylene is stored in the tank under a pressure approximating close to 300 pounds per square inch, but the gas is absorbed in such a manner by a special material that this pressure is only approached upon the delivery of the acetylene. In one type of such a starter, known as the high-pressure system, the acetylene is delivered under its full pressure to the distributer, located on the dash board. The distributer consists of a cone valve having a single port, or opening, in its face through which the gas from the tank passes. The seat of this cone, or the surface against which it rests, is provided with as many ports as there are cylinders in the motor, each port being connected with its cylinder by means of a small pipe screwed into the pet cock or relief valve of the cylinder. When the distributer cone is revolved, its single opening registers with each of the cylinder ports in succession, and a certain amount of acetylene is thus admitted to each cylinder, there to mix with the air already in the cylinders. The controlling valve is so arranged in some designs that it is opened by pushing in on the same handle used to rotate the distributer. Thus, one revolution of the handle will give



HERE IS AN ELECTRIC SELF-STARTER

This is combined with the ignition and lighting systems. When used as a starter the dynamo becomes a motor and engages with teeth cut on the flywheel.

each cylinder an explosive charge and by holding the valve open, the motor may be made to run on the acetylene and air mixture as long as the supply lasts.

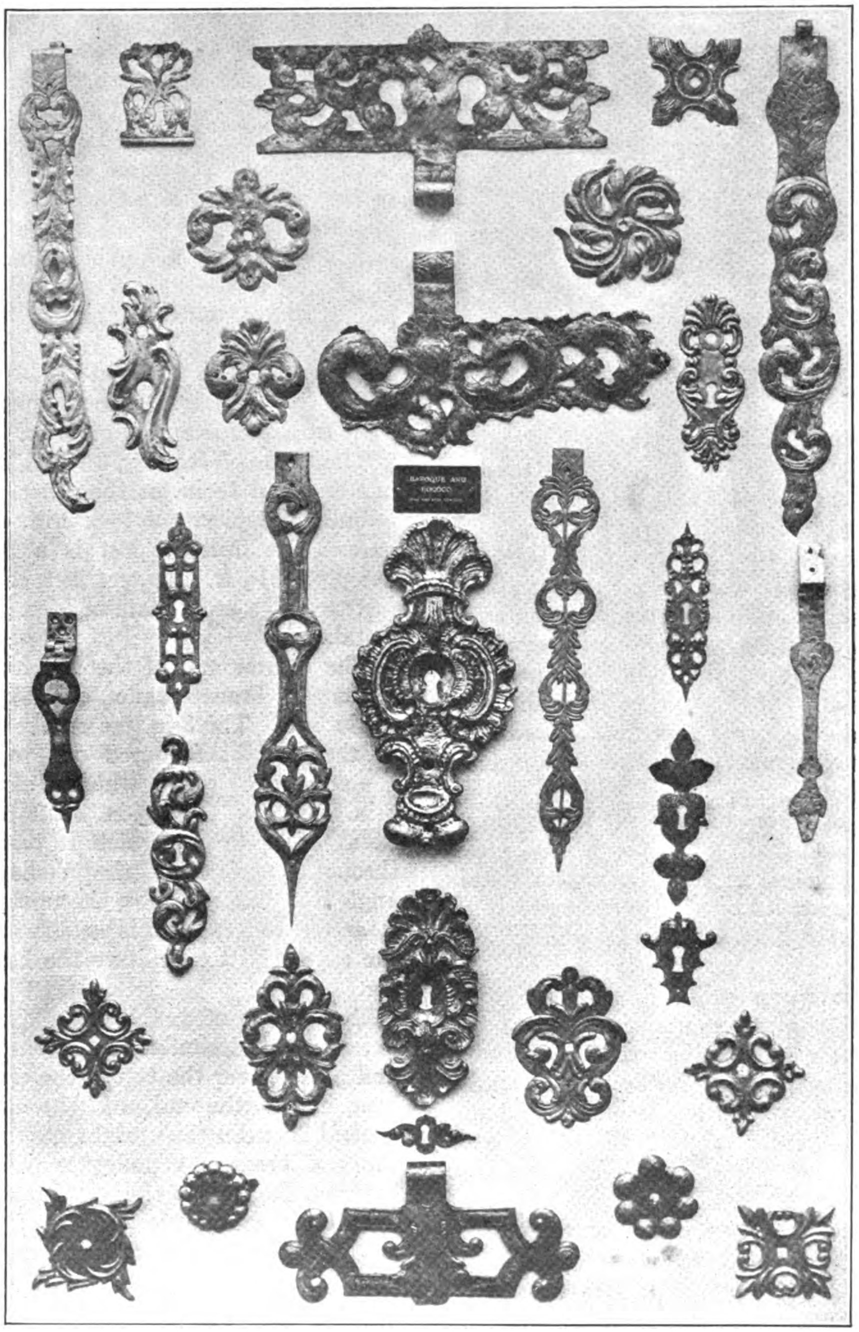
It has been stated that acetylene gas will explode between wide variations of the proportions in which it is mixed with air, but to obtain the best results from the ignition starter it has been found that a mixture of about half air and half acetylene is necessary. As the pressure of the gas in the tank will vary, the amount of acetylene admitted to the cylinders will differ and its proportion in the mixture will therefore be changed unless the quantity is regulated to correspond to tank pressure. This is accomplished in some types by the use of a needle valve which may be set to correspond to the tank pressure, by a stop which automatically regulates the amount of opening of the main valve, or by the speed with which the distributer is revolved. If the distributer is turned slowly, it is evident that the connections of the various cylinders with the gas tank will remain open longer, thus allowing a greater amount of gas to flow through the ports to compensate for the decreased pressure in the tank.

This proper regulation is obtained in still another way, by the use of the low-pressure system. This system employs a reducing valve at the tank, by which the pressure of the gas is reduced to a few ounces. The gas is led from this valve into a multiple hand pump located on the dash and which is operated by a single handle. When this handle is pulled out, the low-pressure gas is sucked into all of the small pumps, there being one of these connected with each cylinder of the motor. When the handle is pushed back, the acetylene is forced from each small pump into its corresponding cylinder, and thus, the amount admitted is always the same, regardless of the pressure in the tank.

The acetylene starters are simple in their operation and have but few moving parts. Although a distributer is often used, unlike that employed in connection with the compressed air starter it does not need to be timed. It is exceedingly important that all of the high-pressure acetylene connections should be tight. It is better that the acetylene gas should not enter the cylinder in the vicinity of the spark plug, for at this point the mixture will be too rich and the motor cannot be started until the gas has become more thoroughly diffused with the air in the cylinder. If the motor is of the "T" head type and the spark plug is located over one valve on each cylinder, the acetylene pipe should be let in on the other side and provided with a nozzle which will shoot the gas across the cylinder toward the spark plug. If this is not done, it will require an appreciable time for the explosive mixture to work over toward the spark plug where it may be ignited. This nozzle may also be used and turned in the other direction if the acetylene pipe must enter the cylinder in the immediate vicinity of the spark plug.

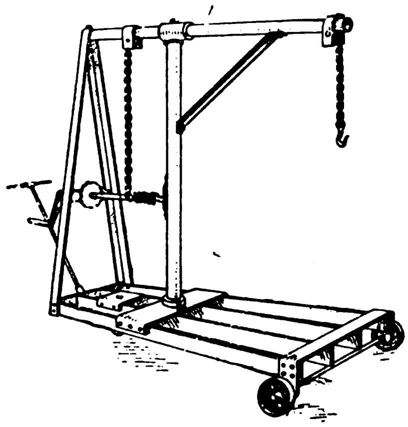
The pipes and valves used in connection with an acetylene starter should, under no consideration, be composed of pure copper, for the gas has a chemical action on this material which forms a highly explosive fulminate. The repair man should bear this in mind and when replacing broken acetylene pipes should be *sure* that none is composed of pure copper.

Like the air starters, the acetylene,



SOME OLD TIME DOOR PLATES AND HINGES FORGED IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES

or explosion, type will not operate on a four-cylinder motor that has stopped on dead center. It is rare that a well cared-for motor will stop on dead center, however, and owing



A PORTABLE CRANE SHOULD HELP THE GENERAL REPAIRMAN

to their light weight and simplicity, the acetylene starters are used extensively on the 1912 cars. A fourth type of starter which has distinctive merits, is purely mechanical and operates on the energy from a coil spring that has been automatically wound by the previous revolutions of the motor. When a clutch that connects this spring with the crank shaft of the motor is thrown into engagement and the spring is released, the motor will be "spun" until the energy of the spring is exhausted. This is nearly always sufficient to start the motor running under its own power, however, and such starters are exceedingly satisfactory. In some types, the spring is rewound on the first few revolutions of the motor under its own power, after which the winding clutch is automatically released. In another type, the spring is not wound until the main clutch of the motor is disconnected and the car "coasts." In this latter system, the starter is located in a special compartment of the transmission case, just forward of the gears and, therefore, is an equipment that is intended to form an original part of the car, and is not designed to be attached afterward. There is a type of spring starter, however, that is designed to be attached to the forward end of the crank shaft in the position usually occupied by the starting handle and such an equipment may be applied to any car. The spring starters, together with those of the electric type, possess the advantage of being able to "whirl" or "spin" the motor, regardless of the position in which the pistons may have stopped. In other words, these types can start a motor that has stopped with a piston on dead-center.

A Portable Crane

A portable crane of simple design and one that should prove of considerable value and use in the smith shop is described in Popular Mechanics. This handy labor-saving device should prove of great help to the smith who is caring for automobiles. For lifting one end of an automobile or for removing a motor or power plant this crane will be found almost indispensable.

This crane can be easily constructed of scrap material picked up about the shop. It is made principally of gas pipe and angle iron.

The base is 5 ft. long, 3 ft. wide at one end and 18 in. at the other. It is built of 4 pieces of ½ x 3-in. iron bars. The upright post is a 3-in. gas pipe, 6½ ft. long, set in a collar fastened to a cross plate of ½ x 6-in metal.

The narrow end of the bed has a V-shaped brace made of 1½-in angle iron. The 3-in. tee on the top of the upright is bored out to fit the arm of the crane, which is also a 3-in. gas pipe. A 1¼-in. shaft constitutes the drum, which is passed through bearings in the V-shaped angle-iron brace and on the upright. A crank and ratchet is attached to the outer end to facilitate the hoisting.

Two straps of metal, each ¼ x 4 in., are shaped similar to a horseshoe and placed over the top of the crane arm, one at the end, and the other central between the upright post and the end brace. A pulley is placed between the ends of these straps, and a hole cut on the under side of the pipe to allow the chain to enter the pipe.

An Improved Post Hack Saw

D. Foster Hall

Every mechanic who has power in his shop needs a power hack saw. It is certainly a money-saver and one which works with very little attention.

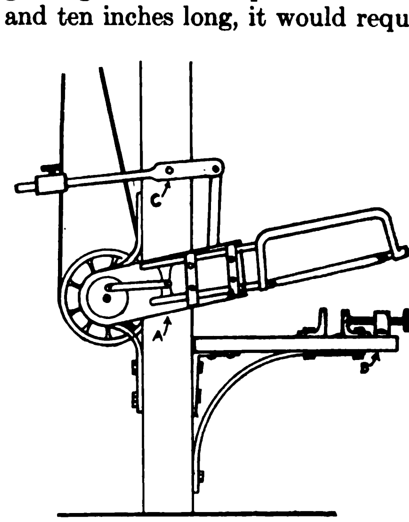
The engraving shows a hack saw made on new lines and is not only desirable, but easily made. It consists of a six-inch bearing into which is fitted a one-inch shaft. On one end of this shaft is the belt pulley, and on the other end is the crank pin wheel. The frame A is of six-inch channel iron, one end of which is fitted to the crank shaft. The other end is planed out for the extension of saw frame which is held in place by two guides, which are fastened to channel frame by two screws. The saw frame can be made of ⅞-inch square cold rolled stock which can be welded to the extension. The table B is made of six-inch channel iron and braced to carry the ordinary load. The usual clamping attachment is fastened to this channel plate as shown.

The balance of the saw and frame and also the saw tension is regulated by the weighted arm as shown at C which is hinged to channel plate. This installation is fastened to an upright six-inch post. The saw can be stopped and started by shipper on countershaft, but can be operated automatically if desired.

A Shearing Tool For The Power Hammer

Bert Hillyer

A tool for shearing out plates and links that are connected by studs and pins in making chains, can be cut out quickly with a steam hammer and a tool as shown in the engraving. As some plates are nine and ten inches long, it would require



AN EASILY CONSTRUCTED POWER HACK SAW

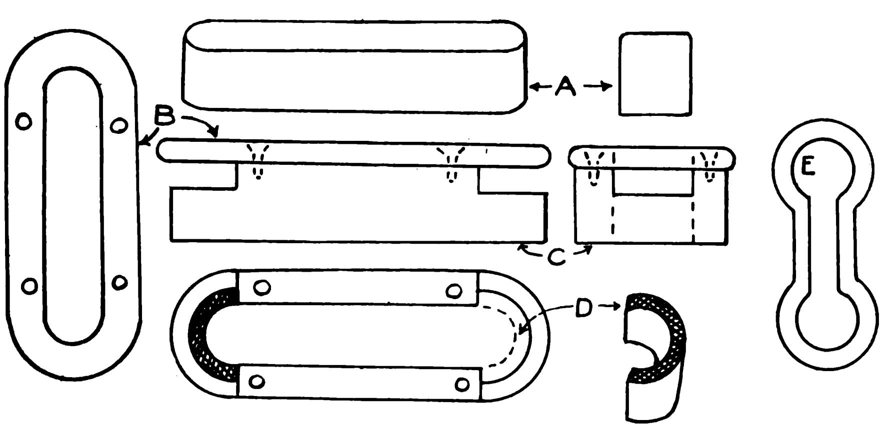
quite a large piece of tool steel to make this tool from the solid tool steel, besides the labor of forging to shape and machinery. The tool in the engraving is made with an outside frame which can be made of

soft steel or iron. The half circular cutters and punch are the only parts required to be of tool steel and these are easily shaped and tempered. The half circle dies can be taken from the frame and ground sharp again when they become worn, which gives it the advantage over the solid tool. This tool can be made to cut out most any shape by making a ring of tool steel by the weldless method and shaping it to the form of the article wanted, one shape being shown as the inside of E in the engraving. The frame and other parts are made to fit, the punch first, and the cutter is then closed up around it. In making the frame, take a piece of rectangular soft steel or iron fuller in on top and on one side so as to draw out a recess for the cutter to set in. Do the same with the part that is to be the other end. Then bend around and weld. In making this tool, there should be enough clearance to allow the piece cut out to drop through with the punch. A piece of round iron can be screwed into the side of the frame to be used as a handle in pulling back tool to let piece drop out. A large number of these pieces can be made in a day with this tool and everyone will be exactly alike.

In the engraving A, is a side and end view of the punch proper. The guide plate for the punch is shown with a top and side view at B. At C, are shown the side and end views of the tool. The opening in the end allows the work to be inserted. At D is shown the tool with a cutter in one end and a cutter about to be inserted in the other end. The piece at E is a cutter in one piece for other work.

Apologies to Farm Implement News

IS YOUR DIKE STRONG ENOUGH TO HOLD THE SWOLLEN STREAM?



DETAILS OF A SHEARING TOOL FOR USE UNDER THE POWER HAMMER

Cold Tire Setting From An Observer's View-Point

OBSERVER

Having occasion quite often to visit a smith shop where THE AMERICAN BLACKSMITH is read, and noting the discussions on tire setting in its columns, I thought an item by an observer would be of interest.

Being rather observing I watched the work as it came into the shop and was being done. One customer came in and said he wanted his tire set. He asked the blacksmith if he set tires cold. The blacksmith said they did not, but they set them hot and not too hot. The customer said he had some tires set in the past week and they were loose again and the spokes rattled in the rims. The smith asked him if they took the tire off and cut the rims before setting same. He said no, as he was told that this was not necessary.

The blacksmith took the tire off, sawed the joint and wedged the spokes tight. He then put his tire in the fire and upset it until he had the proper draught. Then he warmed the tire and put it on the wheel. The result was very satisfactory. Then the smith showed us a number of tires that had been tightened with what he called an edge grip machine. Those tires had one sharp edge, and the grip held on the thick side and slipped a little on the thin side. This resulted in kinking the tire edgewise in every place where the machine had been applied. I also saw tires

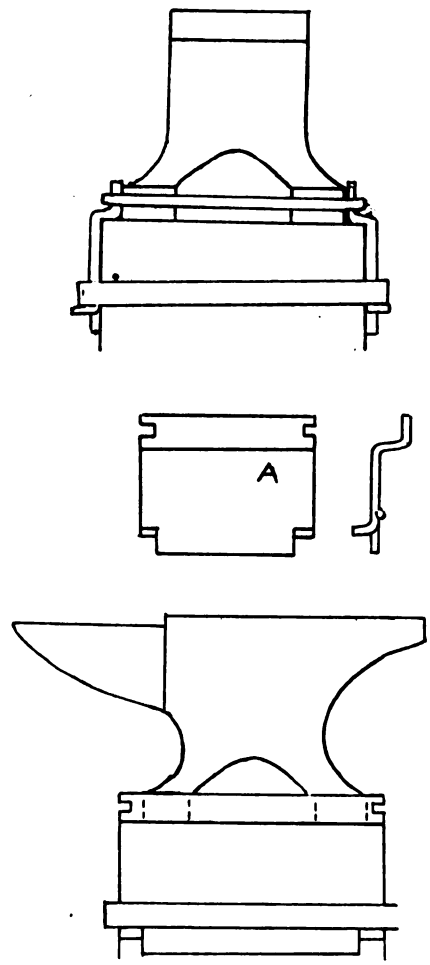
that were crimped like an old washboard, and looked as though they would be a rather hard on the rub iron on the side of the box. I finally made up my mind that the old smith and his old ways were pretty good, on general principles.

I asked the smith what causes so many rim bound wheels. He told me there were two reasons, one being the wheels are left too straight, or a lack of proper dish, and another is too many bolts. Too many bolts may be harmful in this respect: They are so close together that the tire cannot expand without taking the rim with it, either pulling the spokes out of the hub or pulling the rim off the end of the spokes. He said also that a good many spokes were cut off below the surface of the rim and the wheel left too straight, causing it to hammer on the ends of them and bruise the shoulders into the rims until the wheel was rim bound. He said that the best practice was to cut the rim so that when the tire is set there will be $\frac{3}{16}$ of an inch dish. Also bolt the joints and put a bolt in between every other spoke and the results will be satisfactory.

To Repair The Anvil Block and to Hold The Anvil

J. W. MITCHELL

The reason I fixed my anvil this way was because the block had begun to split. I think this kink will be of use to some brother readers. I first shaped up two pieces as shown at A out of $\frac{3}{16}$-inch sheet steel. The offset on it takes up the space from the block to the base of the anvil. The notches are cut out at the top to receive a square frame made of $\frac{5}{8}$-inch square stock, to fasten the two pieces and the anvil together. Another square frame is made of 1 x $\frac{5}{16}$-inch stock to hold the pieces tight to the block at the bottom. The lips turned up at the bottom on the pieces A are to keep the 1 x $\frac{5}{16}$-inch frame from working down. In assembling the four pieces together, the pieces at A and the $\frac{5}{8}$-inch square top frame are placed together on the block and then the 1 x $\frac{5}{16}$-inch frame is driven on hot to shrink the lot together. The anvil was then lifted into position.



HOW AN ANVIL BLOCK WAS REPAIRED

How to Apply for A Patent, and Something as to Patent Rights

ELTON J. BUCKLEY

A correspondent suggests that one of these articles present some practical information as to the law of patents; what can be patented; something as to how a patent is applied for and what protection it affords.

There is no rule requiring an applicant for a patent to employ an attorney, but it is usually much more practicable to do so, especially in cases where technical descriptions have to be filed. As a matter of fact, the drawings in such cases, and often the description of the invention, whatever it may be, absolutely need to be done by a patent draughtsman, if not by a patent attorney, as the ordinary layman wouldn't even know how to approach the task. At the same time, no set form is necessary, but the description needs simply to be clear and precise. In some cases I have known a layman of mechanical turn of mind to frame a description to satisfy the patent office, especially if the device is simple, but it can be safely laid down as a rule that the aid of an attorney or a draughtsman will always be found more satisfactory.

A patent will be granted, to use the language of the law itself, for "any new and useful art, machine, manufacture or composition of matter or improvement thereon, or for a new or original design." In other words, anything within these classes which has not before existed or been known. It must be an actual invention, however, rather than a mere mechanical novelty or an exhibition of mechanical skill. Neither will the result of a process be patented, but only the chemical or mechanical means by which it is produced.

A patent will be granted for a recipe or chemical process, provided it is new and embodies real invention. In the past an enormous number of recipes have been patented, but the wisest inventors of such things do not now patent them at all. The risk is too great. They have always been leaks in the Patent Office, and many times the description of the process has escaped. If it was especially valuable, the history of patent litigation shows that there was always somebody to seize and use it, plunging the original patentee into tedious and enormously expensive litigation, in which all the shrewd resources of the best patent lawyers were used against him. The unlawful use of his invention meanwhile going on in several parts of the country at once. Literally hundreds of inventors of recipes or chemical processes have been robbed of the fruits of their labor in this fashion, and for this reason inventions of this sort are now very rarely patented. The inventors keep them secretly locked in their own breasts.

Another reason for keeping clear of the Patent Office with inventions of this class is that even if it can be kept from leaking for the life of the patent—seventeen years—it then expires and becomes public property.

Making a little clearer the expression "life of a patent," a patent is granted for seventeen years and will not be renewed unless the original patent was in some way defective.

No man will be granted a patent on anything, however valuable, which has been in use more than two years from the date of his application. This rule works out sometimes to great hardship. A client came to me several months ago with an improvement to the sewing machine, which he had labored over for a long time, and which would have partly revolutionized the industry and brought him in large sums of money. Before putting him to the expense of a patent application, I made some investigation, and found that one of the large sewing machine companies had been using the device for more than two years, though no patent had been applied for on it. I was compelled to advise the client that his application would inevitably result in failure, and his long months of toil were therefore, practically wasted.

Neither will a patent be granted for an invention which the inventor has abandoned to public use; that is, permitted whoever wanted to use it, and this is so whether the permission to use it is given in so many words or by implication, and whether it is given before or after the application for patent is made.

Now, as to the actual application. It is always preferable to have a search made of the Patent Office records, in advance of the application, in order to learn, as near as can be, whether the idea has been patented before. Ordinarily such a search can be obtained for \$5, and while it does not furnish an infallible forecast, it at least throws some light on the path ahead.

If the search appears to show that no patent has been granted on this particular idea, the application is filed. With it must be sent the first fee of \$15, which, incidentally, is not returned if the patent is refused.

The application for a patent consists first of a petition addressed to the Commissioner of Patents; second, of a specification or description of the idea on which patent is desired; third, a claim, and fourth an oath. The petition is formal, and simply prays

AN INDIANA GENERAL SHOP, RUN BY MR. J. D. CARRICO

that patent be granted. The specification or description is a clear, precise explanation or analysis of the idea, and must be accompanied, whenever the circumstances will allow it, by drawings or a working model. The test of the sufficiency of drawings and description is that they must be sufficiently clear and complete to teach any person skilled in the particular business to work the process described. If the idea is a chemical process, the ingredients, proportions, manner of compounding, etc., must be given in full. The claim is simply an averment that the applicant—or the applicant's assignor, if there has been an assignment—has made the invention. The scope of the patent is measured by the claim; no more will be granted than is claimed. The oath is simply a detailed averment of the truth of all statements made.

If the application is in proper form the Patent Office takes it under consideration, and in due time either rejects or allows it. If it is refused an appeal lies to the Commissioner of Patents. If it is allowed, the applicant receives notice to this effect, and this is the time the final fee must be paid. The patent will not be issued until this is done. The final fee is $20, which makes the total cost of the grant $35 to the Government. Barring some small expenses for notary's fees, preliminary search, etc., this constitutes the entire expense outside of attorney's fees. What an attorney would charge cannot even be approximated; it depends wholly on the circumstances of each case.

During the interval between the date an application is filed and the date when the Patent Office acts on it, the applicant is permitted to protect himself if his device is actually on the market, by labeling it "Patent Applied For." This the law holds notice to the world that the matter is under consideration by the Patent Office.

A patent can be assigned either before being granted—when it is in the application stage, in which case the patent, if granted, will issue to the assignee—or afterward. Or the patentee can hold it in his own name and merely issue licenses to others to operate under it. If while an application is under way through the Patent Office it is discovered that somebody else has either patented it before, or has a better right, through priority of use, to patent it now, the Patent Office declares what is called an "interference," and the parties fight it out among themselves.

The remedy of the holder of a patent against an infringer is twofold. If he has a case he can obtain an injunction against him, and can also obtain an accounting of all profits made from the infringing article. It is an extremely vital point of patent infringement that the man who uses or sells an article that infringes upon another, although he is in complete ignorance of the fact, is equally liable to the holder of the patent with him who made the infringement knowingly. Not long ago, for illustration, a Western retail dealer who had innocently bought a patent scale from the manufacturer was sued by another manufacturer who claimed that the scale infringed upon his patented device. The retailer lost his case and was compelled to give up his scale and pay damages. He afterward, I believe, got satisfaction from the manufacturer who sold him the scale, but was put to much bother and trouble.

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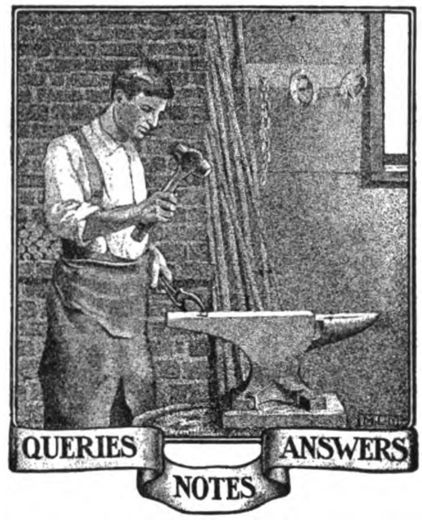
Opportunities

Here are listed a number of live opportunities for live blacksmiths—towns and localities where blacksmiths are needed. If you want to start anew and if you have the necessary energy, skill and perseverance to stick to business until business sticks to you, get into touch with these business chances. Write to the man or firm named under each address.

Tennessee—at Bath Springs.
Address J. A. Brasher.
North Dakota—at Skogmo.
Address John T. Skogmo.
Kentucky—at Lunda.
Address H. F. Williams.
Kentucky—at Maloneton.
Address J. D. Murray.
Kentucky—at Shoemaker.
Address Shoemaker and Elam.
Kansas—at Kingery.
Address Richards and Co.
Kansas—at Turkville.
Address Robert Stein.
California—at Cisco.
Address H. M. Freeman.
California—at Baldwin Park.
Address D. J. Shultis.
Arkansas—at Lanty.
Address C. C. Adams.
Arkansas—at Pinetree.
Address Postmaster.
Arizona—at Redrock.
Address W. J. Crowell.
Kansas—at Lowell.
Address J. C. Hobson.
Iowa—at Tilton.
Address Postmaster.
Arkansas—at Countiss.
Address J. M. Countiss.
Alabama—at Murrycross.
Address J. W. Berry.
Alabama—at Roxana.
Address A. D. Adcock.
Arizona—at Paradise.
Address C. A. Walter.
Kansas—at Kossuth.
Address Wm. L. Silsby.
Arizona—at McCabe.
Address F. J. Fay.
Kansas—at Eaton.
Address A. V. Sanborn & Co.
Kansas—at Grove.
Address Postmaster.
Arkansas—at Jacksonport.
Address E. C. Jones.
Kentucky—at Lamb.
Address Murphy and Taylor.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. Names omitted and addresses supplied upon request.

Wants a Power Hammer.—As I have had no experience with power hammers, and would like to purchase one, I would appreciate information from fellow craftsmen as to which make they consider the best for a general repair shop and the reasons for their choice. S. B. Wallace, Louisiana.

Trouble with Transfer Designs.—Will some brother craftsmen kindly explain how I can put on transfers successfully. I have been trying the Palm-Fechteler make for quite a while, but I have had no success whatever, and am quite sure that the fault lies with my workmanship.

S. A. Flynt., Georgia.

A Shoeing Question.—Will someone tell me through the columns of The American Blacksmith what to do for a horse six years old that is stiff in his hind quarters, especially at the hips and drags his feet. When not worked he feels pretty good, but always rests on one leg more than the other.

C. H. Zeigler, Ohio.

Softening Brass for Rivets.—3/8 brass rods cut any length for rivets in riveting chip or fly off. I cannot expand the end enough for a head to hold. Can I soften them so that the rivet expands and thus be enabled to burr both ends, or shape like a common iron rivet?

Charles M. C. Perry, Australia.

Several Questions for Readers.—Will some of the readers of "Our Journal" give a few hints on welding copper? What is the expansion to the square inch? I would like to know the expansion of other metals, also such as brass, iron and steel. What is the correct way to take measurements for making rings or bands?

N. W. L., New York.

A Question on Springs.—We have quite a little automobile repairing in connection with our other work and have had some trouble with new spring work, to get them to stand up to the work. They do not seem stiff enough and settle down after awhile. Would some reader give information in regard to the way they handle a new spring, tempering and so on.

An English Postmaster Smith.—I do all kinds of smithing, also cycle building and repairing of motors. I employ three men in the smithy, and look after the cycle and motor part of the business myself. Prices are rather low here. Ordinary shoeing is 2s. 6d. ($.61) per set. I pay my best hand 27s. ($6.57) per week, which is the highest wages in this locality. I have had the premises for thirty-seven years, and I am also the local postmaster. This is managed by my wife, two daughters and an assistant.

W. Foulkes, England.

An Ohio Letter.—I like The American Blacksmith very well and do not see how I could get along without it. I run a general repair shop and do all kinds of work. Prices are fine and payments prompt. I have no bad debts of any description to contend with.

I enjoy reading the discussions on cold tire setting. There are none of these machines in our section and I would like to try one if the prices were more reasonable.

That Vicious Mule.—I read in one of the issues of The American Blacksmith last spring an article written by Mr. McLain as to how he was nearly killed by a very vicious mule which he attempted to shoe. He was to bring suit against the coal company who owned the mule and who had given him no warning of the animal's vicious nature. Will you kindly publish the developments of the case in The American Blacksmith as I am very much interested in the outcome of this case.

A Reader, New York.

Words of Praise from Kentucky.—Enclosed find renewal of my subscription to your valuable paper, which I prize very highly. It is a great paper to keep the shoer and smith up-to-date, as you advertise the latest and best machines and tools. It was in your valuable paper that I saw the L. S. P. Calking Machine advertised and I knew it must be all right or you would not advertise it. Now I have one of the calking machines, and I wish to say right here that it is more in every way than the L. S. P. Calking Machine Company claim for it. It is not only one of the greatest time and labor-saving machines I ever saw, but it does the work perfectly, better than by hand, and that one machine alone is worth more to me than your paper would cost me in a thousand years. Every smith and shoer ought to have your paper.

G. W. Conn, Kentucky.

Prefers the Old Way.—I do not wish to discourage any invention or improvement for the betterment of our business, but after forty years' experience in tire setting, I find that nine times out of ten the tire must come off to wedge the spokes, saw up felloe, put in new spokes, etc., and in setting the tire on the wheel none of this can be done. Another objection is that by taking a grip on a cold thin tire sufficient to take it up smashes the thin edges in the felloe and you have no chance of taking out the kinks if there are any. Give me the hot shrinker that takes the tire on the flat and gives you a chance to true up and take out the kinks. I use the McCoy one-man upsetter that clamps a tire on the flat, takes it up and trues it at one heat. I agree with Brother F. L. Davis, although I always cool my tire perfectly cold before I run it and give it a sixteenth-inch draw on a light wheel and more on heavy wheels.

J. F. M., New Jersey.

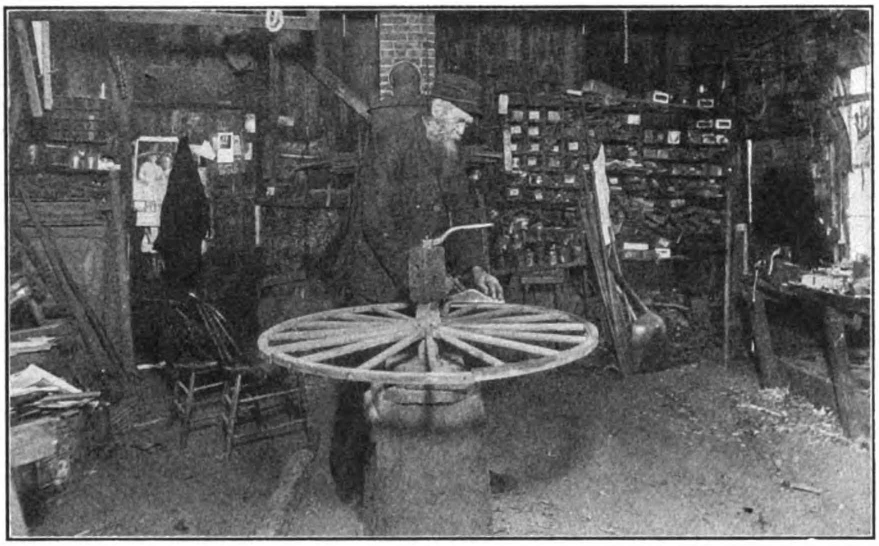
Building Forges.—Noticing that Brother L. O. Lewis wants a plan for a forge, I give my method. I have three built on this plan and all are giving the best of satisfaction. Start chimneys from the floor or ground and build up to where you want the opening for draft. Make hole to suit and then continue on up. The forges are made of steel plates ¼ inch thick, as large as you want the forge, hole cut out of plate as large as the fire pot so that the flange of fire pot will rest on plate. I took some old tire iron and made the legs the length I wanted the forge to stand from the floor. They have been in use for the last five years and are as good as when put in.

M. E. Goller, Pennsylvania.

Another View of Cold Setting.—I have been a reader of The American Blacksmith for years and I find it very interesting. It contains more information than all the other papers combined, and I am always glad to receive it.

As there has been so much talk about cold tire setting, I would like to say something in behalf of it. I have been using one for the past seventeen years, and I know the good of one. I can set a tire on a wheel with a cold tire setter as good as any man the old-fashioned way. As I tell my brother craftsmen, the reason they talk so much against them is that they don't own one. I am a foreman in a shop that runs two cold setters. We set tires every day and they give entire satisfaction.

D. C. Car, Kentucky.



ONE OF THE CRAFT'S VETERANS. MR. J. CRAWFORD, OF ILLINOIS, WHO SPECIALIZES IN VEHICLE BUILDING AND REPAIRING

Shoeing Interfering Horses.—One day shortly after starting in business for myself a colt that had been taken to several of the best shoers in the county was brought to my shop for shoeing as they could not stop it from striking. It had on four interfering shoes and would strike with all four feet. I took them off, fitted up four common shoes with good heel and toe calks and to the shape that I believed was right for a horse to wear. The result was perfect freedom from striking. I have followed this plan with good success ever since, and I have had some bad ones and also some wicked ones to my sorrow. When I see a case of odd-shaped shoes, I think the maker may be a good blacksmith and is better with the file, but that he does not understand all about horseshoeing.

N. L. Howe, Massachusetts.

Tempering Gun and Revolver Springs.—Forge your spring from a piece of good Black Diamond tool steel, being careful to get your spring of a uniform thickness. Do not file your spring crosswise, but run your file lengthwise of the spring in finishing. When well finished and shaped, heat to a uniform bright cherry heat, drop it into a vat of common machine oil. When cool, take out the spring, put it in a ladle or fire shovel and cover with machine oil. Now hold it over the fire, blowing your fire gently until the oil in the ladle has all burned up. Then allow the spring to cool slowly.

Some brother wants to know how to temper buggy and auto springs. I have had the best results by not tempering them at all. After welding and shaping the spring I cover them up with ashes so they cool as slowly as possible, and they usually give good satisfaction.

F. W. Hansen, Missouri.

Pulley Speeds.—Will someone kindly tell me how to figure out the size of a pulley to put on the line shaft when you have the number of revolutions your machine is supposed to run and the revolutions of your line shaft and also how fast should an emery wheel grinder run with a ten-inch stone.

R. M. Adams, Nebraska.

In Reply.—The rules for calculating the size and speeds of pulleys are as follows: To find the diameter of the driving pulley, multiply the number of revolutions of the driven pulley by its diameter and divide by the number of revolutions of the driver.

To find diameter of driven pulley, multiply revolutions of driver by its diameter and divide by revolutions of driven.

To find revolutions of driven pulleys, multiply diameter of driver by its revolutions and divide by diameter of driven.

To find revolutions of driver pulley, reverse the last mentioned rule.

In regard to the emery wheel, a ten-inch stone should for ordinary work be driven at between 1,500 and 1,900 revolutions per minute.

M. D. H., New York.

Some Plain Talk.—As a rule, although there are exceptions, the smith has the least business ability of any of the trades. A first-class mechanic will make but a poor book-keeper. What we want to do, therefore, is to place our business on a strictly cash basis. That is the only way to protect one another. The houses from whom he

buys his supplies, etc., require cash, which is the reason they exist today. The man paying the cash is not balancing a credit account for some other man, as he is too often doing with us. Charge a fair price and collect it. The man that cuts your price is only, or will in time, injure only himself, for the reason that he must as a rule do inferior work or he would not cut.

I am sorry to say that there are too many poor workman in our business or craft, especially in small towns. They are not competent to work as journey men, but start in business and practice at the public's expense. Therefore, they cut prices. Sometimes they know very little about prices, where they have competition, but if alone in a community, their patrons pay enough and a little more for cheap work.

R. T. H., Colorado.

From the Australian Gold Fields.—Your paper I consider the best I have seen, as it is full of useful information and I always look forward to every issue. The town of Sofala is on the once famous Yuron River gold field, about 175 miles from Sydney and I am working on the gold dredges. We have a shop in the town for doing our work, which is of a heavy class, the buckets weighing seven hundred weight each and there are thirty four on each dredge. The buckets work on an endless belt. The buckets lift the dirt from the face and then go up a ladder and empty over a top tumbler into a chute where the gold is extracted.

There is a class of steel I use very much and I have never seen it mentioned in your paper, that is, manganese steel. All our pins and brushes are made from it. It is non-magnetic and cannot be welded or bored, and is only worked at a blood red. I should like to hear some discussion on it. Previous to taking on dredge work I served my time in Sydney as a coach smith so I find a lot of interesting reading in THE AMERICAN BLACKSMITH. I have been in my present employment for the last ten years. W. J. SMITH, New South Wales.

A Letter from Texas.—I have been smithing eight years, have worked in several big cities, but at present and for the past three years have been located in a small town of about 300 population and have plenty of work. My equipment consists of a 6 horse-power engine, two power fires, polishing head, emery-stand, Mayers cold tire setter and all necessary tools for up-to-date smithing.

I notice G. F. Goben, Richard Loader, W. K. Huff and others seem to have a dislike for cold tire setters. I beg to differ with these gentlemen in this matter, as I have used a cold tire setter for five years and still have a big tire trade. I think a great deal of the trouble lies with the operator of the machine.

Will some brother smith send recipe for nickel plating suitable for using on bits and spurs. I do silver mounting, but want a recipe for plating.

Will send price of work here:

Horse Shoeing	$1.00
Tire Setting	2.00
Sharpening, per inch	.01
Wagon Tongues	3.50
Wagon Axles	3.50
Filling Wagon Wheel	4.00

And other work in proportion.

J. L. JONES, Texas.

Shoeing Prices in England.—I think THE AMERICAN BLACKSMITH is the best paper we can read for good sound advice on our trade. I have a new modern shop, light and airy, with two fires with double-blast bellows and water tuyere iron, vises, benches, etc., also two drilling machines and a store room for coke and iron, nails, etc. I use the Capewell nail which is very good and used very extensively in England. There are five men and one apprentice in the shop, and we do all classes of shoeing from the race horse to the heavy draught horse. I have heard and read a great deal about fast shoeing, but I believe the best plan is to do good work and it will gain a good trade. I started here eighteen years ago with not enough work to keep me busy and have succeeded in building up a large trade. The following are some of my prices: I have some contracts to shoe horses at 5s. 6d. ($1.34) each per month with sharpening extra at 2s. 6d. ($ .61) each horse. 5s. ($1.22) per set for heavy horses and as low as 3s. 6d. ($ .85) per set for the smaller ponies. There are many shops that cut prices, but I don't know how they make it pay. We use mostly drift studs and make a charge of twopence ($ .04) per hole extra for punching and threepence ($ .06) per hole for screw studs and the studs that I supply vary in price according to conditions.

WILLIAM GANT, England.

A Texas Letter.—My shop is 45 x 24 and is equipped with a 6 H. P. Weber gas engine, a 26-inch band saw, wood-turning lathe, Kerrihard power hammer, a power blower, two fires equipped for hand or power, a drill press, an emery stand and a Little Giant punch and shear. I also run a corn mill in connection with my shop. Our prices are very bad.

Horseshoeing, 4 new shoes	$1.00
Tire-setting	$2.00 to 3.00
Common plow point	.50
Sharpening plow shares	.10 to .20
Wagon tongues	3.00 to 3.50
Wagon reaches	1.25 to 1.50
Buggy singletrees	.50
Shafts	1.50 to 1.75
Crossbars	1.00
Buggy stubs	$6.00 to 8.50 and 9.00

The ruin of the blacksmith trade today are the inexperienced men who have bought old tools cheaply and set up in business. I have several old outfits, practically worthless, which I could sell to such men as these, but it would mean the ruin of my own business.

If the smith understands his business he can set a tire cold just as well as he can hot, otherwise he should leave them strictly alone. Most of my customers prefer the cold setting.

G. N. SMITH, Texas.

Tire Setting and Fast Shoeing.—I am at present building dump wagons for a brick road contractor, and although I have never done any work of this nature before, I am succeeding in making a good job.

I would like to say a few words regarding tire setting. Two leading wagon makers I know bought cold tire machines a few years ago, but they have set them aside and have gone back to the old way. I have myself had a great deal of experience in tire setting and I find the old way the best if done right. In the first place you must get your wheel in proper shape with all the joints tight and every spoke driven tight on the shoulder, and the rim down on the end of the spoke. Give your tire 1/8 inch draw when your tire is cold and it will make a good job. Never run a tire when it is hot. Some smiths advise us to allow the heat for draw, but this is not always successful, for this reason: It may be that the first heat covers one foot, and the second, two feet, so one will have more heat than the other and will certainly be larger, and when cooled will have more draw and dish in one wheel than the other.

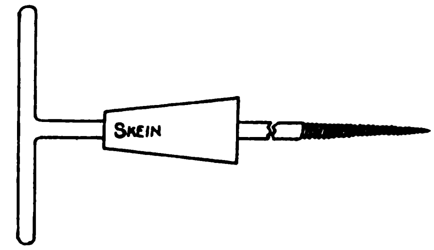
Regarding fast shoeing, I notice where a brother can shoe a horse in four minutes. I think if a man shoes a horse in an hour and does it right he is working fast enough for the good of the horse.

W. F. SHOOP, Pennsylvania.

A Tool for Pulling Tenons.—Take a lag screw and weld it on a rod about as long as the spokes. Then weld a rod cross the end for a handle. Now take an old skein and slip it over the rod. Bore a hole in the tenon and turn the lag screw in tight. Now drive back on the skein. This is the best tool to pull broken spokes that I have ever seen. It may be what Louie Gillmann, Jr. of Tennessee is looking for.

G. S. O., Missouri.

The Apprentice Problem Again.—I wish to say through "Our Journal" that I appreciate the question and answer department, especially the questions in the March



A TOOL FOR PULLING TENONS

number. It is a settled fact in my mind that very few of us know what our business is paying us, especially when we consider the question, should rent be charged against the business if the proprietor owns the building; and also taxes?

I wish to say a few words on the apprentice question, speaking from experience along this line. I have had three in as many years, each one agreeing to work for one year, but only one worked as long as seven months. It means too much time and trouble for the smith if they remain only so short a time. They expect you to treat them better than a member of the family. They stay with you until some other smith who has had nothing to do with their training offers them more money. You have had the trouble of training them and another gets the benefit.

Some say "Give the apprentice a chance." This is all well enough and just what we should do, but after one has had such experperience as I, they won't want any more apprentices. Of course some are all right, but anyone who wants to take the advantage of you can do so and you are helpless. Does anyone know of a remedy? If so, we would all like to hear about it.

NICK JACOBS, Kansas.

Several Answers to Questions.—I was apprenticed in 1860 in my native village in the south of England, worked twelve years there and then came to Texas where I am known as a mechanic. Although I work but little at my trade at present, still I am ever interested in what others are doing or trying to do for all are to a certain extent still learning the trade.

In answer to three requests in the February journal, I have the following to say:

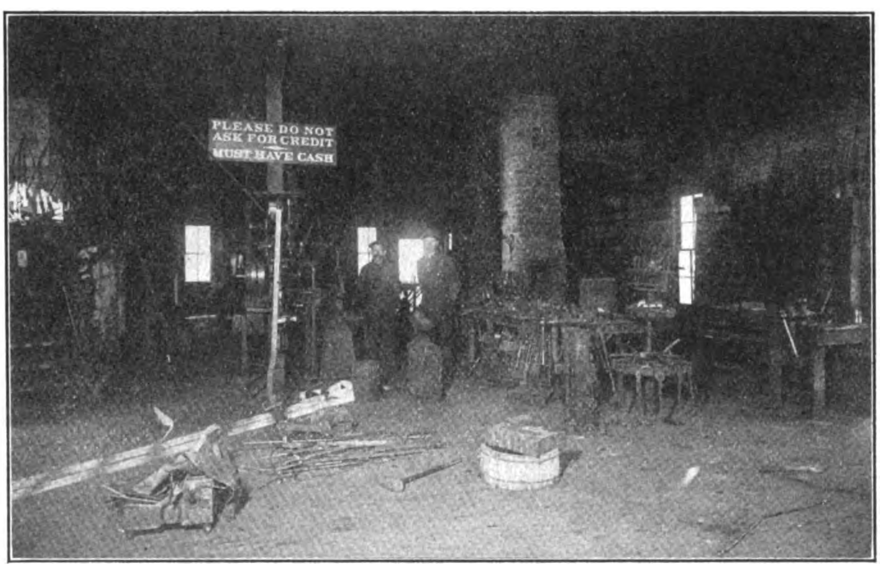
Brother C. E. Beck of California should use extra heavy shoes behind and extra light in front.

Brother Peterson of Scotland. The best tuyere I have ever used is a large, say 2½ or 3-inch pipe running through the forge from back to front with a screw cap on the outer end, with say a 5/8 to one-inch hole where I want the fire. Punch a hole through a thick piece of flat iron with a tapered punch all one way and bend it over the hole in the pipe to take the heat of the fire off the pipe.

Referring to the request for plans for a forge, I wish to say that the best I have ever used was built as follows. Three parallel brick walls with a space of about twelve inches between the first and second and

three feet between the second and third or according to the size wanted. The two back walls carry the chimneys with an opening in the center wall for a draft from the fire. The ashes from the fire drop into the twelve-inch space. The twelve-inch space between wall one and two should be bridged over with iron or lumber and a large iron pipe tuyere iron from back to front. W. S. MACKRELL, Texas.

The Fast Shoer Challenged.—I can not refrain from a few words about those rapid-fire horseshoers from Texas. As it is at long range, I will take a long chance. We might naturally expect the world's championship would go to Texas, but the claimant does not say whether or not he had any extra loads ready in case any of the nails went amiss. I do personally think that Texas should be barred. It isn't really fair, for those fellows have all the advantage and I am not the least in doubt as to the record time being correct, for I am aware of the fact, that the record he claims has been shaded considerably and so close to the four-minute mark that he would have to take a pinch bar to slip in between. Still it was not put into print. However, we will concede everything to him, accept the Champion Horseshoer of the World. At best we can only concede to him champion floorman, because for him to claim champion horseshoer of the world is rather a broad assertion. Now if he is looking for that title, he must turn, or make his own shoes, (no machine shoe goes), do the job from raw material from start to finish. Now, come on old pal, be game. I am for you, to show them what you can do. I know you can do it—anyway, take a chance. The mark is already established for you to shoot at. It was an advertised public exhibition, some thirty or more horseshoers present, to see a square deal. They got a square deal, too. Now you play fair. Invite all the horseshoers, everybody interested and beat this public record. You will be welcome to the pennant, all the honor, all the glory and all that goes with it. Now as you have made the claim to champion horseshoer of the world, make it good. Missouri.



THE POWER SHOP OF MR. F. W. MINER, OF NEBRASKA

A Missouri Price List:—

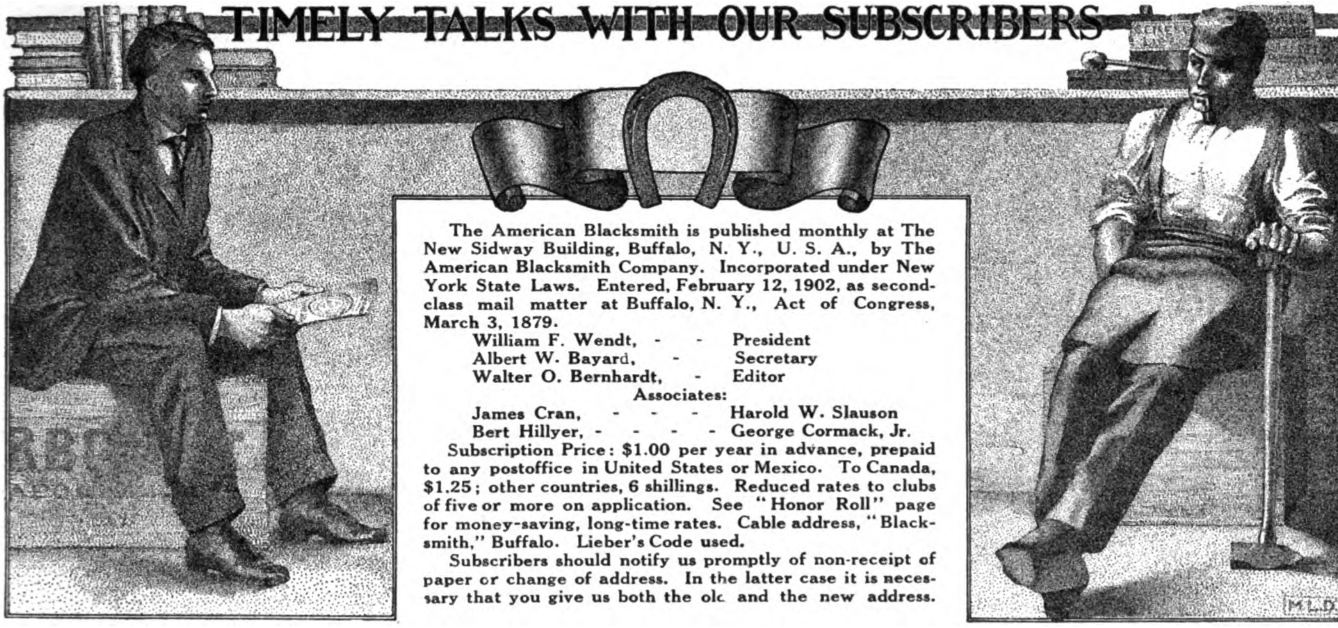
4 old shoes, reset	$1.00
4 old shoes, retoed	1.20
4 new shoes, No. 1 to No. 5	1.75
4 new shoes, No. 6 and No. 7	2.00
2 new bar shoes	1.50
2 new sideweight shoes	1.50
4 new Neverslip shoes	$ 2.50
4 Neverslip shoes reset	1.00
4 Neverslip shoes recalked	1.00
Plow sharpening, 12 inch	.25
Plow sharpening, 14 inch	.30
Plow sharpening, 16 inch	.35
Plow pointed, 12 inch	.75
Plow pointed, 14 inch	.85
Plow pointed, 16 inch	1.00
New plow shares	3.00
New plow shares, 14 inch	3.25
New plow shares, 16 inch	3.50
Sharpening disc blades	.25
Rolling cutter blades	.35
Cultivator shovels	$2.50 to 3.00
Sharpening cultivator set	.50
Trimming cultivator set	.75
Setting 4 wagon tires	2.00
Setting 4 buggy tires	2.50
1 set of one-inch buggy stubs	7.00
1 set of 1⅛-inch buggy stubs	8.00
1 set of 1¼-inch buggy stubs	10.00
1 set of 1 x ¼ buggy tires	6.00
1 set of wagon tires	10.00
Spoking and rimming 4 wagon wheels	20.00
1 new wagon axle	3.00
1 circle hound	3.50
Wagon spokes, each	.25
Wagon felloes, each	.25
1 wagon tongue	3.00
1 buggy tongue	3.00
Coupling pole	1.00
1 buggy reach	1.25
1 pole circle	1.50
1 buggy shaft	1.75
1 buggy cross wire	1.00

C. R. EDWARDS, Missouri.

A Few Lines On Tire Setting.—One brother states that you can make the tire smaller than the wheel with a cold tire setter. Measure your wheel and tire correctly and just make the tire tight and nothing more. And when you heat your tire to put it on the wheel just warm it, but not hot enough to burn the wheel. Bolt your wheel down on a good tire-setting plate and use a good tire puller to pull your tire on the wheel. When on, hammer it down true and let it stay on the tire-setting plate until it is cold. In the meantime go around your wheel two or three times with a three or four-pound hand hammer and settle the rim down well on the shoulders of the spokes. When you have put on a few tires in this way and have not burned your felloes; when you see how well the warm tire has dried the felloes and when you have not had to snuff the smoke, swing the wheel and hot tire around, I am satisfied that you won't want a cold tire setter to set new tires. I do not see anything wrong with the cold tire setter. A man may not know how to use one, but that is not the machine's fault. The only objection to them is the price.

As to making the tire smaller than the wheel, every time that this is done you spring the spokes, for you cannot spring the hub or the felloes. If you spring the felloes they have to spring sidewise and that throws the strained place from under the tires, and you know that won't do. If you spring the spokes they have to spring edgewise, and that causes the spokes to break off at the hub on the back side. Smiths break more wheels this way than the men that use them. I was taught to make the tire one inch smaller, but by experience and practice I only want my wheel solid. If there is slack in the wheel I measure that all out to make it solid. M. SUSSKY, Arkansas.

Cold Setters and Brains.—Referring to cold tire setting as discussed by some of the smiths who claim to have used them, some of the ideas advanced about the working of the machine only prove to me that they have very little mechanical knowledge of the business, and therefore are harmful to the manufacturers and the users of those wonderful scientific labor-saving machines. They mention kinking the tire and ruining the wheel with dish, the kinks stretching out and the wheel getting loose, etc., which all proves their lack of knowledge on the subject. I have used a House cold setter for about four years, and although I made a few mistakes at first I soon learned to operate the machine, and have had no trouble since, nor a complaint from my customers. As our intelligent brother states, they are made to shrink tires and not to wedge loose spokes. I have learned not to shrink tires on wheels that need repairs without first repairing the wheel, nor on wheels that are wet and swollen. Neither do I try to do all the shrinking in one place, especially where the tire is very loose and bolted between each spoke, because the bolts in the opposite side will hold the tire from setting up snugly to the rim and the man that tries to draw it up all in one place will ruin the wheel with dish before he gets the tire tight on the opposite side. Then again when the wheel is very dry I do not shrink it so very tight, but just enough to hold the wheel, for when it gets wet it will get tighter and dish more, just like it will the old way. A little careful thought and observation will enable anyone to do better work with it than the old way. I very often take off tires and heat them and put them back and hammer them up to the irregular circumference of the rim while it is hot, then cool off and shrink in the cold shrinker as usual until it is tight enough. I am an expert the old way, having followed the business thirty-seven years, but for the past four years since I purchased my cold tire setter I have never shrunk a tire hot. With a good tire setter, if a man will be careful to adjust the wedges and grip keys to the circumference of the tire and not spread the grip key too far apart and not try to shrink too much in one place and clamp it down good and tight, he will have no trouble about kinks or anything else. S. B. WALLACE, Louisiana.



TIMELY TALKS WITH OUR SUBSCRIBERS

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Can You Kick?

It is some time since we have asked you to find fault with "Our Journal"—some time since we have asked you to kick. You know it's "awfully" nice to hear only good things about yourself and to receive only "pats on the back," but an occasional well directed kick is excellent, for many reasons. Now, it's kicks we want, if kicks they must be to answer our questions. We want you to tell us what you don't like about "Our Journal" and what you do like. We want you to open right up and unload that grouch on us. If our questions don't cover the subject as you want to cover it, follow your own inclination. What we are after is a straightforward, right-from-the-shoulder statement as to just what you think of "Our Journal—" what you think it should be and how you think it can be what it should be.

1. What is your honest opinion of THE AMERICAN BLACKSMITH?
2. What changes would you suggest in illustrations, reading matter, general make-up or other particulars?
3. What do you like best in the paper?
4. What do you think could be omitted from its pages without impairing its quality?
5. Do you read "Heats, Sparks, Welds?"
6. Do you read "Around Our Forge Fire"?
7. Do you preserve your back copies? If not, why?
8. Do you read the monthly poems? Would a book of them interest you?
9. In what subjects are you interested that "Our Journal" does not cover?
10. Is there anything else you want to "kick" or "compliment" us for? Tell us all about it.

Don't try to flatter us—we'll pay more attention to a letter with a good big honest kick in it. So, start a-kickin'!

Changing Your Address

When you change your address don't fail to notify us promptly. And then, too, don't forget that we must have both your old and also your new address. It is important that we have both, for we cannot locate your name in our files unless we have your old address, and unless you give us both your old and also your new address you may fail to receive your paper promptly. Then, also, some of "Our Folks" seem to depend upon the letter carrier, rural carrier or postmaster to notify us of changes. Don't depend upon someone else to take care of this matter for you. Take care of this matter yourself. A postal card will do and it won't take but a second of time and a penny to do it right.

Contents, June, 1912

It Encircles the Globe

(Continued from May)

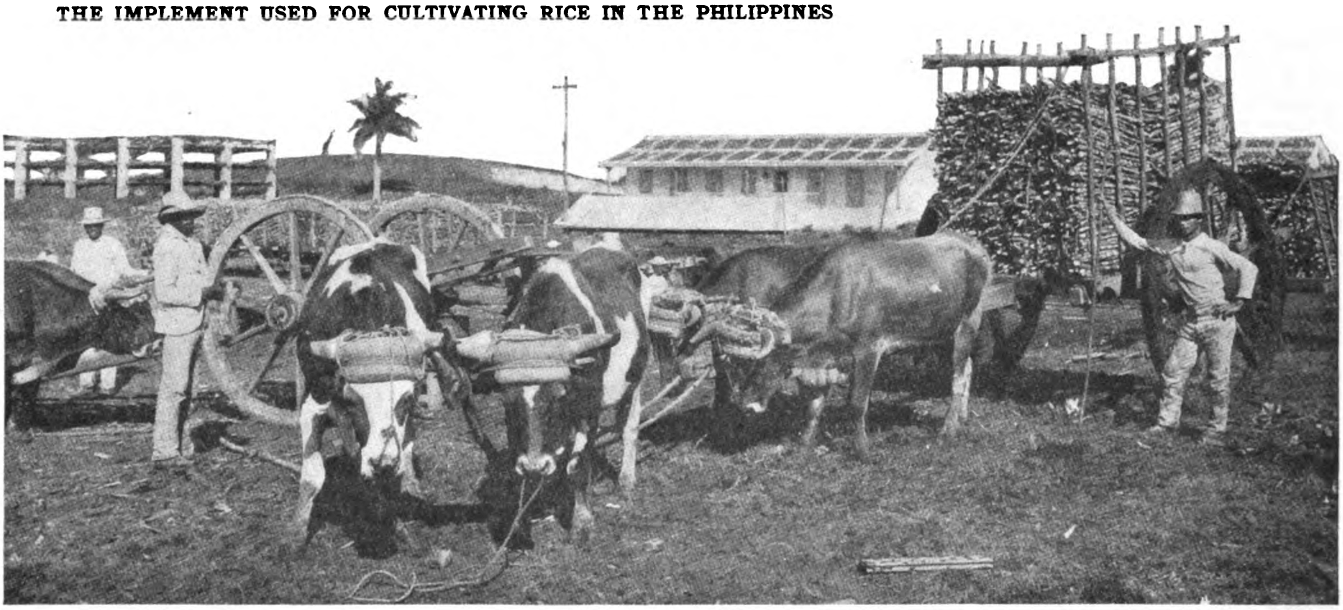
We now end our journey and finally find ourselves back in Buffalo. We have traveled entirely around the globe, visited every English speaking country and several where English is not generally known. We looked into the palatial shops of the cities, the smaller shops of the towns and the general shops at cross roads. We have talked to our English cousins, have stood in the shadow of the Pyramids on the Sands of the Nile, and have seen the crude shops of the South African veldt. We have, with a Kiplingesque vocabulary, cursed the heat of India and have talked with our brothers under the thatched roofs of Philippine smithies. In the more American-like shops of Australia we have watched the fires glow and have been tempted by Hawaii's atmosphere of warmth and ease to forget home. We have shivered in Alaska's Arctic blasts, have traced our way cautiously down into the Dominion, and everywhere, at every turn, on every hand have found warm friends and enthusiastic readers of THE AMERICAN BLACKSMITH.

Preserve Your Back Copies

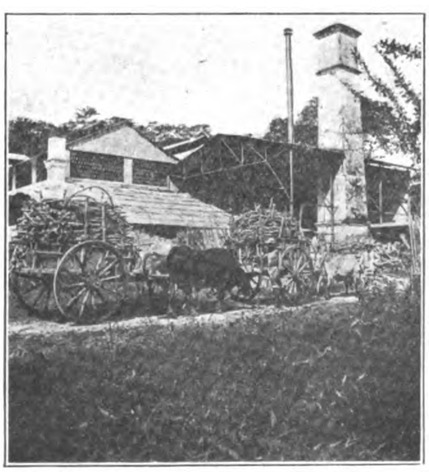
We can now supply serviceable binders for holding copies of THE AMERICAN BLACKSMITH. These binders are of a proper size to hold over a year's issues with the advertising pages, of course. They are very strongly made and with average use should last a lifetime. Each binder bears "THE AMERICAN BLACKSMITH" in gold on the front cover, and as the binder is finished with black binders' cloth it is very neat in appearance. The device for holding the copies in the binder is very simple and allows you to add or to remove a copy at any time without trouble or delay. Certainly a device of this kind is worth 80 cents! Try one, see how it works, use it for the present volume, adding the new numbers as they come to you and then put those back numbers in binders where they will keep clean, flat, and in perfect order. Our files of back numbers for office and visitors' use are held in these binders. We use a binder for each volume of twelve numbers, marking the back of the binder in red with the number of the volume.

THE IMPLEMENT USED FOR CULTIVATING RICE IN THE PHILIPPINES

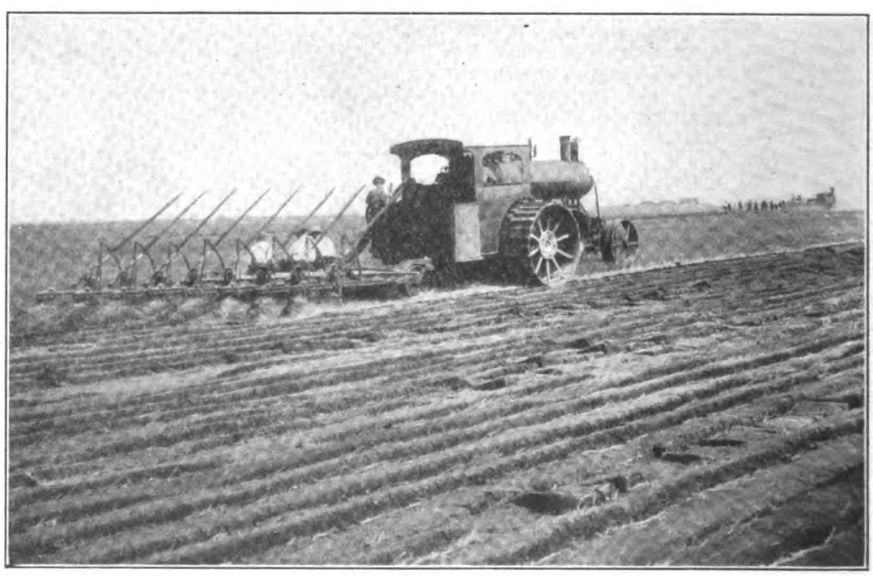
THE MODERN MACHINE DOES THE SEEDING QUICKLY, ACCURATELY AND ECONOMICALLY



THE SUGAR CANE CART IS A LARGE WHEELED, CRUDE LOOKING VEHICLE

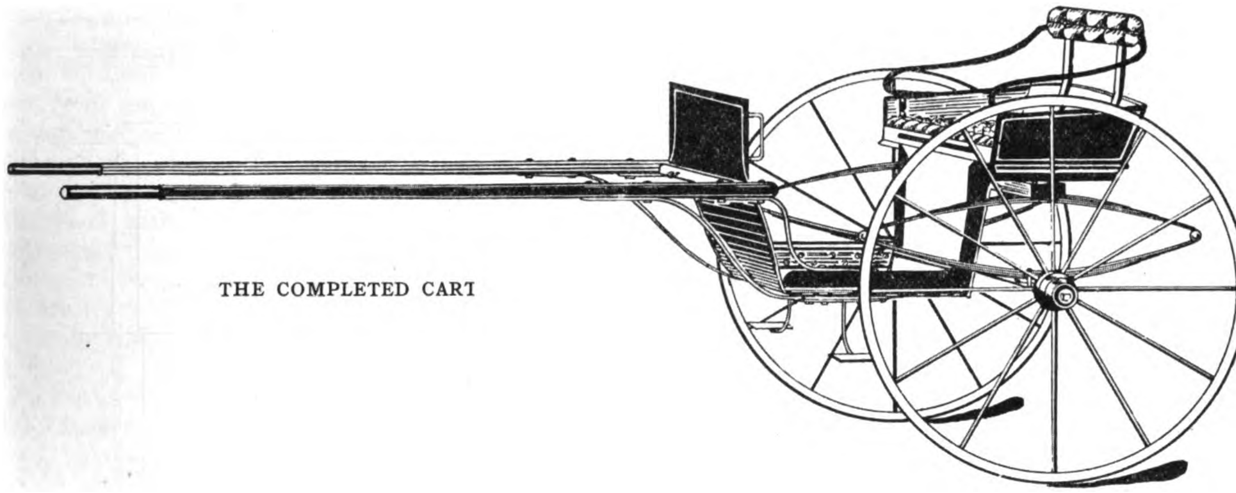


THE SMALL SUGAR CANE CART, DRAWN BY ONE TEAM OF OXEN AND USED GENERALLY IN BRAZIL



A MODERN PLOWING MACHINE TURNS EIGHT FURROWS AT A TIME

A FEW CONTRASTS IN FARM IMPLEMENTS AND VEHICLES



THE COMPLETED CART

Plans For Making A Simple Runabout Cart

J. L. HILL

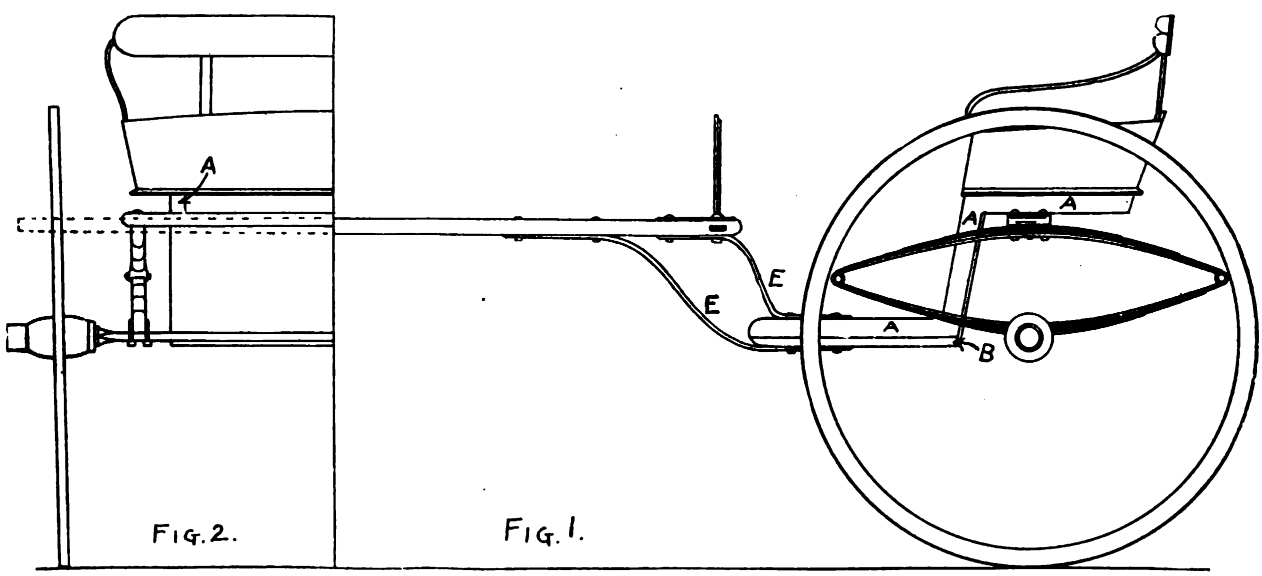
FIG. 1 presents the side view. A, A, A, the rockers, are $1\frac{1}{2}$ by $1\frac{1}{4}$ inches; B is the bottom, which is screwed to the under side of the rockers, and the edges should be rounded over so as to make a good finish on the sides. The rockers are lap-jointed, glued and screwed from the inside, and a light plate is screwed on the inside extending from the front almost to the end underneath the seat. After the plates have been put on with screws and plenty of white lead, put on the back panel. This goes up to the seat, is level with the top of the rockers and extends $\frac{7}{8}$ inch below the rockers so as to be even with the under side of the bottom board. The panel coming down even with the bottom prevents a joint showing at the back.

The shafts having been cut out and dressed up are put together and a plate shown at D, Fig. 3, is bolted on top; the object of this being to give a good bearing for the bolt heads and also to keep the shafts together.

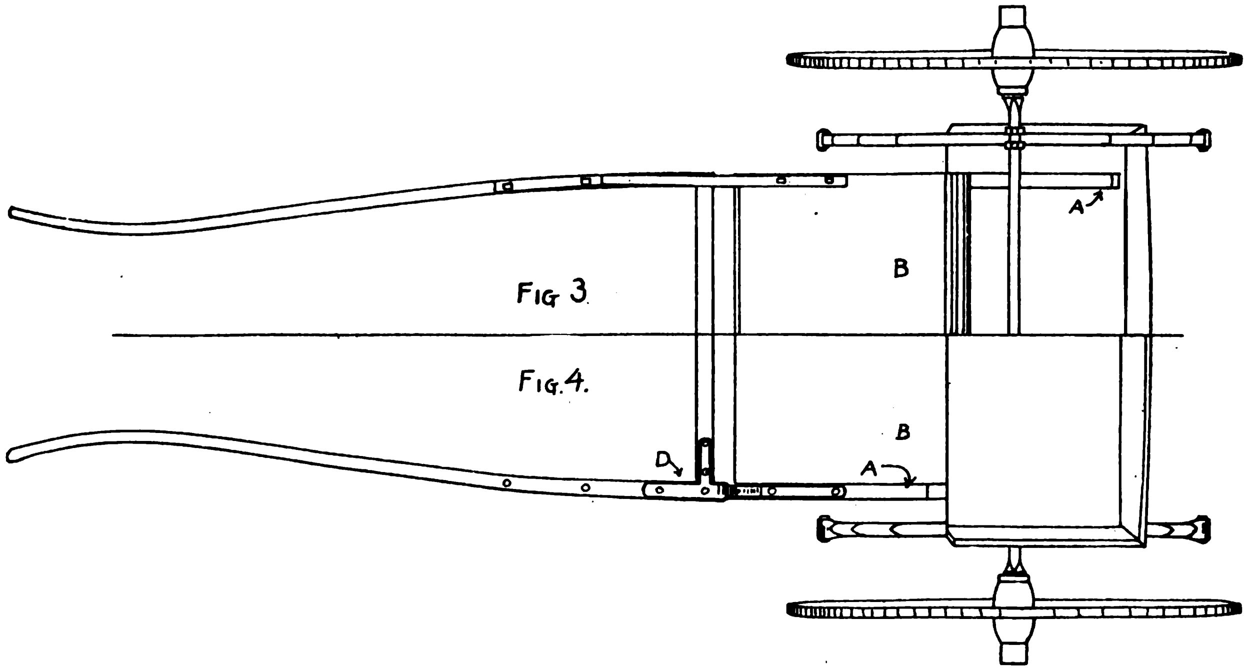
E, E, are made of spring steel, $1\frac{1}{4}$ by $\frac{1}{4}$ inches, and are bolted, as shown, firmly to shafts and rockers. There is very little spring to them, but, as they have to do so much work, spring steel is found to be the best.

This method of attaching shafts to the body leaves the front open; it being filled in by a piece of flexible material—leather, rubber or duck—the same as is used on tops. In one instance, however, the writer saw a piece of very thin sheet iron used, and it seemed to answer splendidly. It was fastened underneath the bottom board and under the shaft bar. The idea can be seen in the perspective view of the cart.

Following are a few of the various dimensions: Wheels, 44 inches, with 1-inch spokes; track, 4 feet 4 inches,



FIGS. 1 AND 2—SHOWING A SIDE VIEW AND ALSO A HALF REAR VIEW OF THE SIMPLE RUNABOUT CART



FIGS. 3 AND 4—SHOWING A HALF TOP AND ALSO A HALF BOTTOM PLAN OF THE RUNABOUT CART

out to out; springs, 36 by 1¼ by 4 by 8 inches, and 36 inches apart on the axle.

Painting: Wheels, springs and axle yellow, striped black; other parts black, striped yellow.

This is a very handy cart for quick trips, and the average farmer should be glad to secure a cart of this style at a fair figure. The painting of the cart can be of practically any color, though the combination suggested is very attractive.

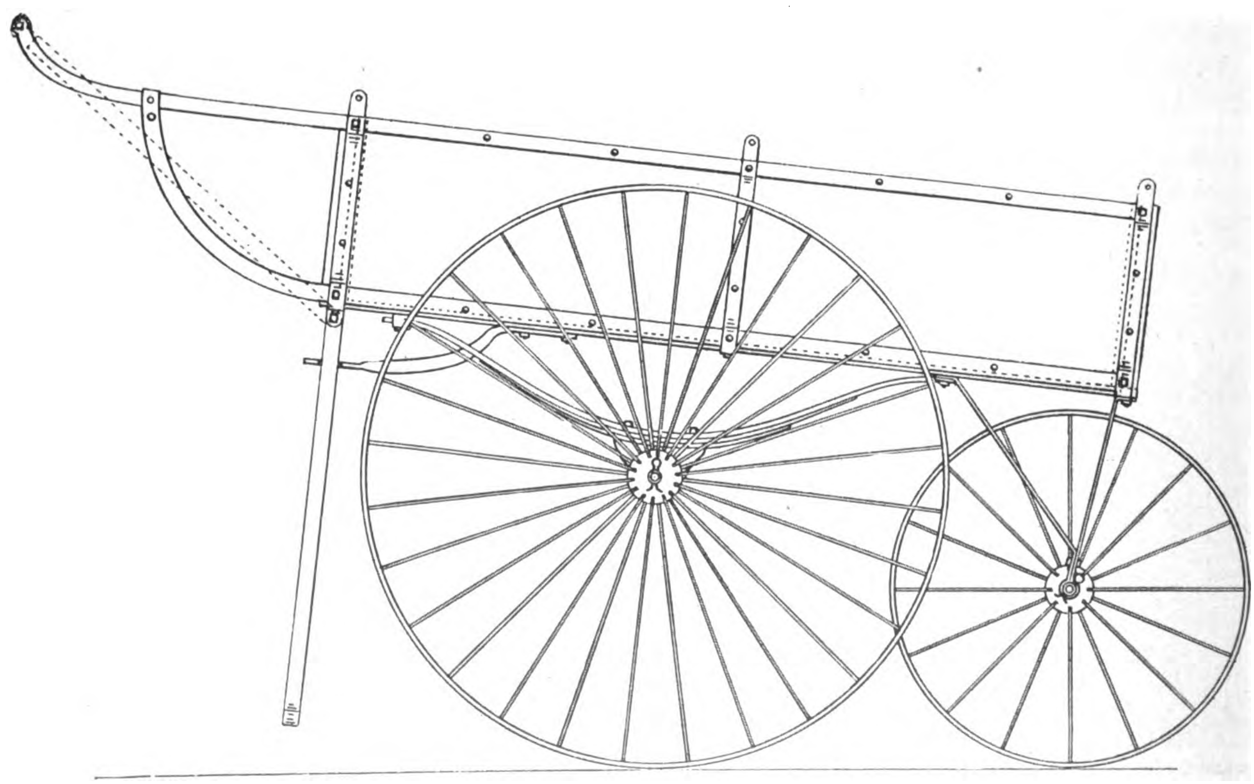
How To Build A Push Cart

H. J. MARTIN

These four views show a simple, light and strong push cart that can be made for carrying light loads up to 50 pounds without overloading it.

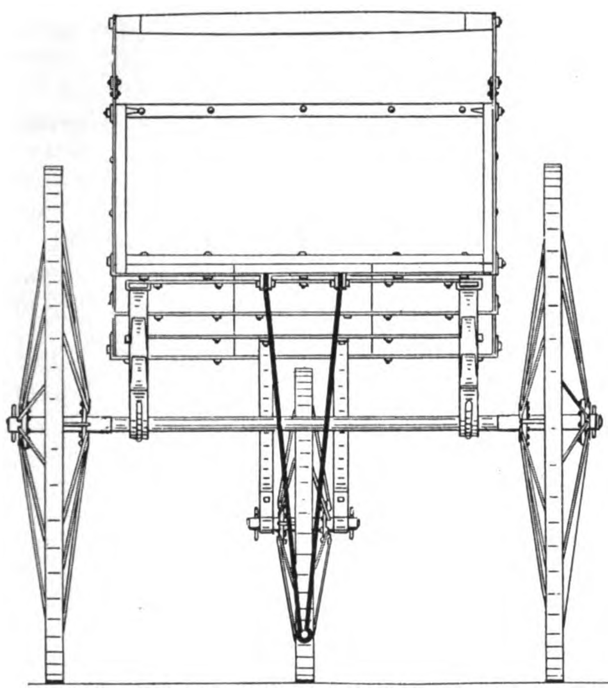
The Construction of the Body

The length of the body is 42 inches. The width is 22 inches and the depth is 10 inches. The body is made of three planed ash boards, ½ inch thick, 7⅜ inches wide and 42 inches long. Make two joints. After being joined the three boards should be 22 inches wide. The two side boards are 42 inches long, 9½ inches wide and ½ inch thick. The two end boards are 21⅜ inches long, 9½

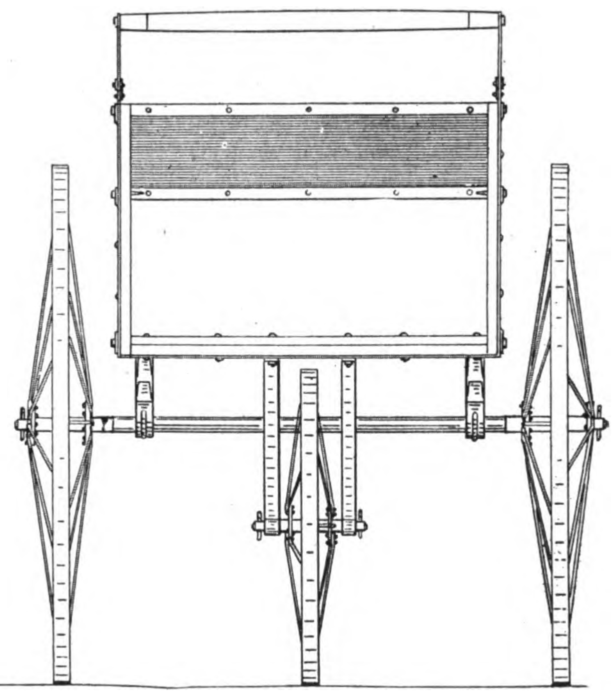


HERE IS SHOWN A SIDE VIEW OF THE PUSH CART, SHOWING ITS SIMPLE, STRAIGHT LINES

inches wide and also $\frac{1}{2}$ inch thick. The end boards are notched, $\frac{3}{16}$ of an inch, into the side boards, $\frac{7}{8}$ of an inch from the ends of the boards. Make two pieces of ash, $\frac{5}{8}$ by $\frac{7}{8}$ of an inch and 21 inches long, and screw them on the top surface of the bottom boards, level with both ends. See that the screws do not interfere with the bolts on the bottom. The end panels are screwed against those end pieces from the inside, four screws being used for each panel. There are two ash pieces, $\frac{5}{8}$ by $1\frac{1}{2}$ inches by $39\frac{1}{4}$ inches long, fitted between the end boards. These two pieces pieces, one inside, the other outside. This will make a groove $\frac{5}{8}$ of an inch deep for the end boards to rest in. To strengthen the body, iron strips $\frac{3}{16}$ by $\frac{7}{8}$ of an inch are screwed on the top and bottom edge of side and end boards. The bottom ones—one on each side—run straight from the front to the rear end of the body and turn up in a circular direction to the upper strip, lapping over on both sides. To do this, another piece $\frac{3}{16}$ by $\frac{7}{8}$ of an inch is bent to fit against both irons and riveted as shown on side, front and rear views. The upper strip is bent as shown in strips. It will be seen how this strengthens the ends and sides. To keep the body from spreading there are two rods $\frac{3}{32}$ of an inch in diameter resting between the bottom boards, and $\frac{5}{8}$-inch pieces next to the end boards. To obtain the space for these two rods, cut the bottom inside corner from the $\frac{5}{8}$-inch pieces before they are screwed to the bottom boards. On the top of the end boards there is no rod, but pieces for a screw thread are welded to the strips at both back and front. See front and back view. This makes a neater job than a rod and is stronger. These four end braces



A REAR VIEW OF THE PUSH CART



A FRONT VIEW OF THE PUSH CART

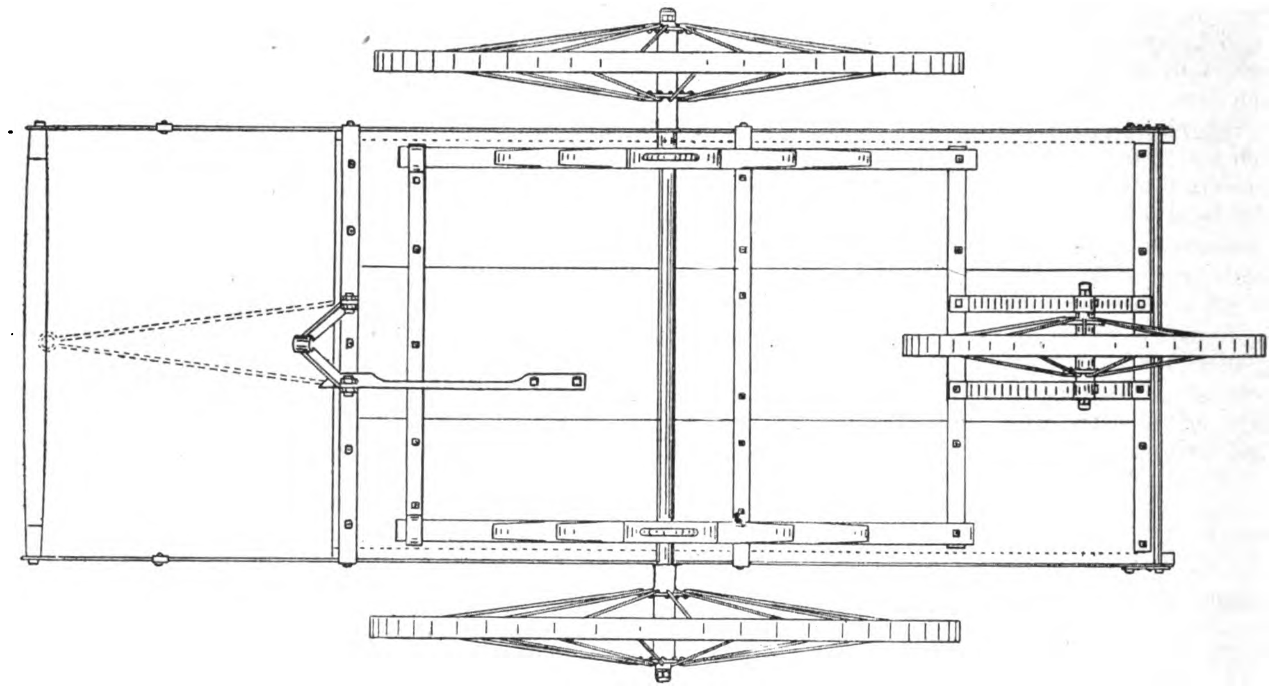
are placed $\frac{1}{2}$ of an inch from the bottom board edges, so that when the side boards rest against them the pieces must be level on the outside. These $\frac{5}{8}$ by $1\frac{1}{2}$-inch pieces are screwed to the bottom boards with six screws for each, and the side boards screwed against them. Put in the two end boards and the body is done as far as the wood work is concerned.

Ironing and Strengthening the Body

Most carts of this kind are poorly ironed, but if this is well done the cart will last a great deal longer. The pieces which are screwed on top of the bottom boards next to the side boards perform two duties; one is to hold the side and end boards in position, the other to strengthen the body and increase its carrying capacity. At the ends there are two strips are bolted through the bottom boards and also the $\frac{5}{8}$-inch side view and both are connected with the wood handle. There is also a strip on the inside. The inside and outside strips are riveted together. The double strips on side and end boards are of the most importance, as in most cases, in loading or unloading, the corners of side and end boards are injured. Besides the above, there are three more strips—one at each end and one at the center. These three strips are alike. They start $1\frac{1}{2}$ inches above the top edge of the body with holes at the ends. These holes are for the cords on the cover, which is used in rainy weather. The vertical strips must be bent over the lengthwise strips at both top and bottom. They go across the bottom, and turn up again on the other side, and are entirely in one piece. At the ends the strips are bolted through the bottom boards and also the $\frac{5}{8}$-inch will keep the body always in a good position and prevent side motion, which is sure to happen when the body is getting worn from much use and overloading.

The springs are $29\frac{1}{2}$ inches long, with $4\frac{1}{2}$-inch openings. They have three plates and are $1\frac{1}{4}$ inches wide. At the front end they are bolted to the bottom boards, but in the rear they are loose and work in a socket. The springs are bolted to the axle with a strap-bolt which is bent around a special casting. Each casting is made in two parts, the joint being at the center of the axle and the strap-bolt passing around and holding the two parts.

There is a stay which is used when the cart is at rest and loaded heavier back than front. When empty, the cart will tip forward on the small wheel. The stay is best seen in the



THIS IS A BOTTOM VIEW OF THE PUSH CART, SHOWING THE UNDER CONSTRUCTION

rear view, but when not needed it is lifted up to the handle and strapped to it as shown by dotted lines inside view. When the stay is down it is locked to the catch shown in the side and bottom views.

The diameters of the wire wheels are 18 and 30 inches. Sixteen spokes are used for the 18-inch wheel and 28 for the 30-inch wheel. The size of the spokes is $\frac{3}{16}$ of an inch. The size of the tires for all three wheels is ¼ by 1⅛ inch. Length of the hubs for the large wheels is 5½ inches and for small wheel is 3¾ inches. Size of the axle is ¾ inch.

These carts may also be fitted with wooden wheels, for which the dimensions are as follows: Hubs, 3½ by 5½ inches; spokes, 1⅛ by ⅝ of an inch, and rims, $1\frac{3}{16}$ thick by 1⅛ inch deep.

A Circular-Saw Bench With Adjustable Table

"Work"

The circular-saw bench shown in side and end elevations by Figs. 1 and 2 is constructed chiefly of wood. It is designed to take saws up to 30 in. in diameter.

In the illustrations, the table is shown raised a certain distance from the frame. When grooving, rebating, etc., with the smaller saws, it will not be necessary to raise the table so high. The raising is accomplished by means of bolts passing through holes bored in the end rails (see Fig. 2); these bolts work in tapped sockets inserted in the holes and secured with strong screws to the rails. Four holes are bored in the table from underneath (two at each end) to receive the ends of the bolts, the shoulders of which bear against iron plates let in and screwed to the table from underneath. Iron plates with holes to receive the bolts are also let into the bottom edges of the end rails, secured with screws. The holes in these plates should be a good fit to the necks of the bolts, so that there is no play and that the bolts work in perfect line with the threads in the sockets. The table is raised or lowered by turning the little hand-wheels shown in Fig. 2.

Two pieces of ¼-in. flat iron G (Fig. 1) are secured to the table from underneath, bearing against the inside of the side rails, to serve as guides, and to insure rigidity to the table when raised. An index is marked on these irons with which the exact height may be ascertained when the table is raised and the level perfectly adjusted. The guide irons should have bridge irons screwed to the rails. It will be seen, by reference to Fig. 2, that the long screw used in adjusting the fence is hung in small brackets secured to the table; the fence is adjusted to the thickness of the stuff to be sawn by turning the hook-handle E. The cleat A (Fig. 1) is not shown in Fig. 2. An enlarged end view of the fence, the adjusting screw, etc., are shown by Fig. 3. The two slot irons S and the butt hinges that connect the fence to the base B allow the fence to be set at any angle. Both table and fence should be made from good dry hardwood.

The bench frame, a plan of which is shown by Fig. 4, should be of good dry red or pitch pine; the dimensions being: Legs, 5 in. x 5 in.; side top rails, 7 in. x 2½ in.; end rails, 7 in. x 3 in.; spindle-bearing piece, 7 in. x 2½ in. (this is tenoned and mortised into the end rails); bottom rails, 4 in. x 3 in. The top rails are mortised to the legs; the tenons of the bottom rails pass right through the legs, as shown in Fig. 2. It will be noticed that the saw-spindle runs in three bearings, the outer bearing being secured to the rail of a small horse. By adopting the third bearing the bench is less apt to rack from the pull of the belt. The rigidity of the bench may be further increased by securing angle irons at each corner to the legs and the side and end rails. At P (Fig. 4) a small portion of the rails is cut away to allow a passage for the screw when the table is lowered on the frame. The pieces B are the bridge irons referred to above.

A plan of the table is shown by Fig. 5. Cleats across the table screwed from underneath are denoted by dotted lines; H being hand-piece which rests on two of the cleats; D shows the position of the guide irons. The hand-piece is removed when

putting on the saw or taking it from the spindle. Beneath the hand-piece, and beneath the table, also, for the length of the fore half of the saw, slips of wood are screwed, to form a rebate on which the packing for half of the saw will rest. The opening G, denotes the saw gate, and S a slot to receive a cleat which should be screwed firmly to the base of the fence. A hole bored through this cleat and the base of the fence receives a threaded bolt in which the long adjusting bolt works. This bolt is secured to the fence by means of a winged nut screwed down on a washer on the base-piece. The enlarged end view of the fence (Fig. 3) will make this clear.

Fig. 6 shows the method of securing the spindle-bearing to the bench rails. The bearings are let down into the rails to allow the table to bear on the frame. The tenons at the bottom of the legs (Figs. 1 and 2) should fit snugly into mortises made in longitudinal runners when fixing the bench. The motion being rotary with such machines, the bench should not be secured to transverse pieces.

About Ice Wagons

W. H. Gunn

There is no economy in building heavy ice wagons. The light wagon of the best material will produce far better results than the heavier kind. Practical experience has clearly demonstrated to me that a wagon should be put up as follows:

Wheels, $2\frac{1}{4}$ on the tread; $2\frac{1}{2}$ by $\frac{3}{4}$ steel tires; front axle, $2\frac{1}{4}$; back axle, $2\frac{1}{2}$; steel solid collar; back springs one plate more all around than the front springs; $2\frac{3}{4}$ wide six and eight plates; height of wheels: front, 34 inches; back, 46 inches; the body should be large enough to carry three tons, or 7,000 pounds.

Two small horses, easily kept, will go right through the season and be in good condition for the next, on this wagon, while the four or five-ton wagons are a load when empty, it requires the largest draught horses to pull them, and they double the amount of feed.

A New Line of Argument On the Cold Setter Controversy

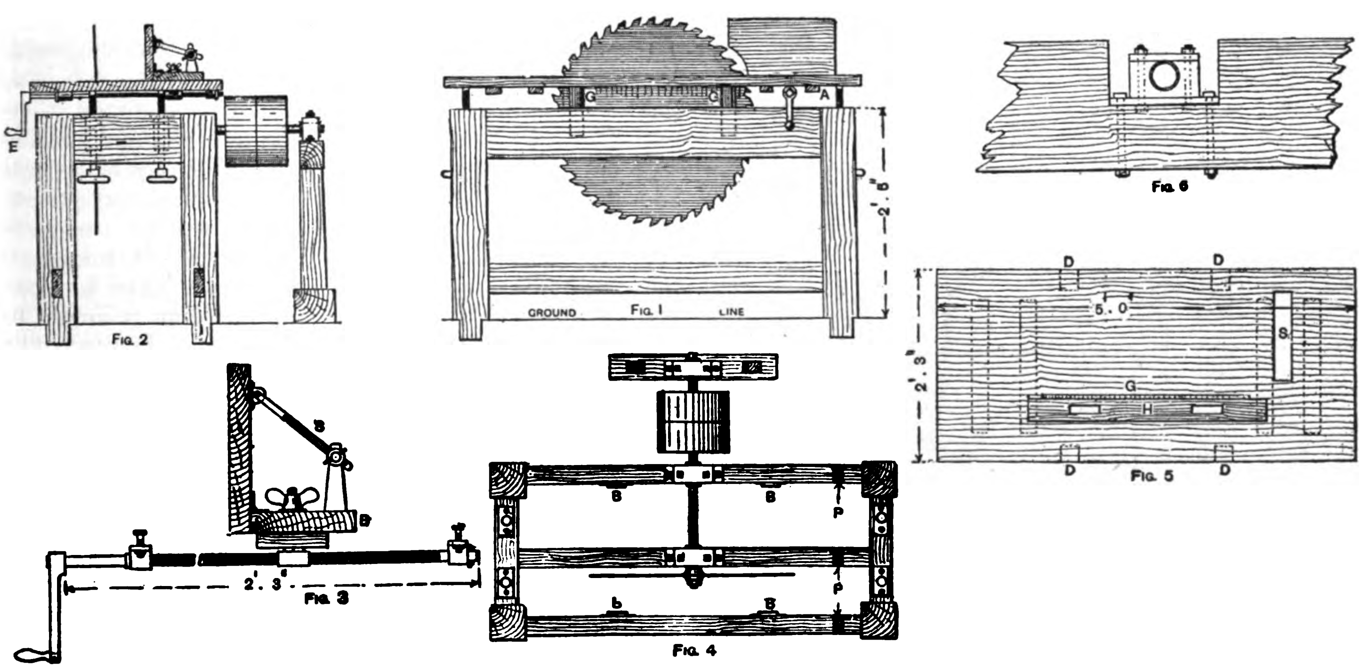
Otto A. Wagner

Much has already been said by the advocates of cold tire setters and the adherents of the hot process; but I think both sides have missed the most vital points.

To begin with I would very much like to own a cold setter if they had proven themselves a clean-cut success like the gas engine, lathe, trip hammer, disc sharpener, etc., for I believe in modern power shop equipment and labor and time-saving tools. I have a gas engine, a lathe, an emery grinder, a power drill, a disc sharpener of my own make, a three-burner brazing forge, an anvil, a blower, a screw-plate set and a good supply of smaller tools.

First: Tire shrinking is a case of plain upsetting of metal; as bending is a case of expanding on one side and upsetting on the other side of a bar. Any smith knows that he cannot bend a bar cold without springing back some. He has to bend it past the angle he wants it to allow for the spring back. So he does also with the cold setter, which gives the wood work a permanent crush and kills the wheel, generally, especially the hub. The tire springs back slightly, instead of closing up gradually but permanently as in the hot process. They charge the failures of the cold setter up to the carelessness of the operator. According to my observations, a careless man will do better work on a hot shrinker than on a cold machine. An expert can do hot setting that is beyond reproach; the cold setter has to be satisfied if he can call his work just as good.

For example, why not drive the rivets of a boiler cold? You have the best chance in the world, for you don't need any jaws to grip them, just simply dies and the power. If you did, your rivets would spring back and your boiler would not hold smoke. A tire springs back just the same as a rivet when worked cold. Could you set a light tire on the outside of a heavy one so that it would be perfectly tight by the cold process? I can by the hot.



THE SAW BENCH WITH ADJUSTABLE TABLE, SHOWING SIDE, END AND TOP VIEWS AND ALSO DETAILS OF CONSTRUCTION

As far as charring the rims is concerned, this is unnecessary with the proper equipment, and there is no excuse for it. And there is none for dishing the wheel hot or cold. Some of the worst overdished wheels I have ever seen were set cold. I have never tried to use a cold setter, but there are several in use in my locality. Some customers will not have their wheels set cold, and one smith has almost stopped using his machine.

Three Kinks For The Wagon Worker

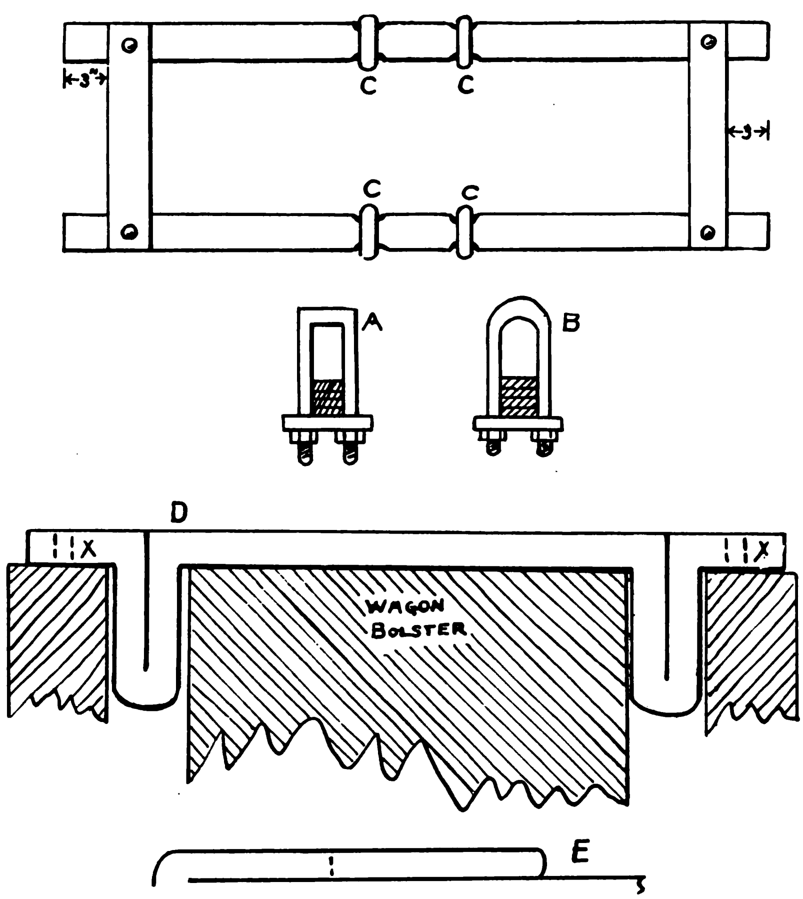
J. H. Jensen

Here are three kinks that will interest the wagon maker and repairer and will help him gain an occasional customer. It is such little matters as these that make a craftsman stand out from the crowd and help him to get customers that would otherwise trade anywhere and everywhere.

The first is a kink for a wagon bolster spring. As these are generally turned out by the factory you will find the clips formed as at A,—the corners are bent square, and here is where the majority of the breakages come. When repairing a job that has come in with the clips broken, here we make new clips, bending them round instead of with a square corner. Then, when fitting them to the bolsters, we chamfer the edge of the stocks where the clips fit,—see B and C in the engraving.

When making new bolsters, or when repairing old ones on which the spreader plates have been broken or pulled off, we always set the plates about 3 inches from the ends of the bolster stocks. This makes a better joint and a stronger brace. The bolts with which the plate is fastened to the wood are then not so likely to pull out at the ends, or the stocks to break at the ends.

The device shown at D is fastened to the bottom of the wagon box, and when the box is placed on the bolsters it fits over the bolsters as shown. At E is shown how this iron is made. It is bent as shown, then held in the vise, and the two ends are opened and bent at right angles. Screw holes countersunk are made at points XX for fastening the irons to the bottom of the box. This iron fits between the stocks of the bolster spring, and when the bolster spring is removed it straddles the bolster of the wagon.



THREE KINKS OF ESPECIAL INTEREST TO THE WAGON WORKER

The Blacksmith's Wage vs. Other Skilled Metalworkers'

A comprehensive table of comparisons of wages paid blacksmiths, boilermakers, molders, machinists and other skilled trades in the metal industries is shown in the report of Dr. J. T. Holdsworth, Dean of the School of Economics, University of Pittsburgh; following his country-wide economic survey conducted for the City of Pittsburgh and the Pittsburgh Industrial Development Commission.

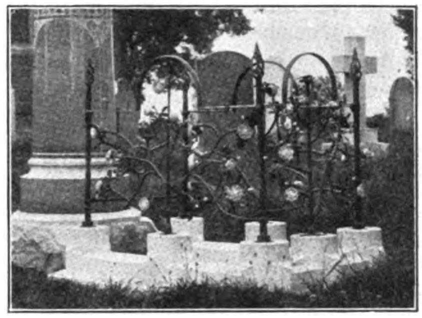
Dr. Holdsworth takes up the purchasing power of the wage dollar in the various cities, and from this system deduces the "real wages" paid the several trades in the leading American industrial centers. He finds the rate of wages per hour in the metal trades as shown in the accompanying table.

An Ornamental Grave Rail

G. White

The engraving shows some ironwork of my own design. The stonework on which it stands I also made from a wooden model. You will see that the parts are all welded and not riveted together; all the welds being forked on but two. The rose leaves are cut from sheet steel, as are also the petals of the rose. The buds are made in a top and bottom tool, which was my first job. It was a very difficult matter to make these. As you will note there are two buds and a full rose welded between two leaves, and the fire has to be watched very closely in welding in order to prevent the leaves from burning. The north and south trees are alike with the exception of one bud. The east tree is different. At the back of the roses is a fine prong piece of work resembling the rose opening. The bough at the end is shoulder welded and threaded, and the center is a small round nut to screw the petal on. The top center rose is bent, and the tops of the three roses are cut as if broken. The top of the standard is made in five pieces, each

twisted before welding. The standards are let into the stone nine inches and held with lead. On the west end and forged in one piece of iron is the year "1898." Under the east tree is a plate of iron reading, "Designed and Forged by G. White, Braunston."



AN ORNAMENTAL RAIL BY AN ENGLISH SMITH

Meeting Competition-2

A Series of Talks on Common-Sense Ways of Meeting Fair and Unfair Competition

By THORNTON

To change a popular proverb: "When cost-keeping knowledge enters the head, price-cutting goes out of the door." When the majority of blacksmiths, horseshoers and general smith-shop repairmen have a thorough knowledge of costs and cost-keeping, the majority of smithing craft abuses will cease. Price-cutting, cheap workmanship, poor material and the numerous other abuses that threaten the profits of the skilled smith can't survive under a system of cost-knowing methods. Of course, there will always be cheap goods, poor workmen and botch work, but these will not and cannot compete with good standard work and workmen.

On this cost-keeping matter, first install some kind of a system for keeping track of your own costs and expenses. This, with the suggestions made in a recent number of "Our Journal" should not be very difficult. Then, try to "get together" with your neighbor smiths and see if you cannot get them to see the light.

Some one said at some time or other: "Ignorance is responsible for all evils." Some of you may not agree in the larger sense of that saying, but ignorance of cost is certainly responsible for most merchandising evils. I cannot believe that a man would shoe a horse for seventy-five cents, for instance, when he knows that his materials and overhead cost him nearer one dollar. I do not think any man is so foolish as to continually sell his goods below cost. Therefore, knowledge of cost will generally give all a chance to make a profit. And when a competitor is doing certain work at a certain figure with a full knowledge of costs on that work, and he is able to do it at a little less than I am able to do it, I am the last man in the world to kick. Why? Because sometimes I am able to do work for a certain price, make my regular profit and sell at slightly less than my competitor. I say that is good business. You may differ, and if you do I'd like to hear your arguments. I'll let you have my arguments later; because they do not properly come under the head of these talks. But to get back to this matter of competition: When you find a smith underselling you, not simply to cut the price, but because he can do the work cheaper, there are either ways of meeting his price or making a specialty of something else, and getting below his price on that.

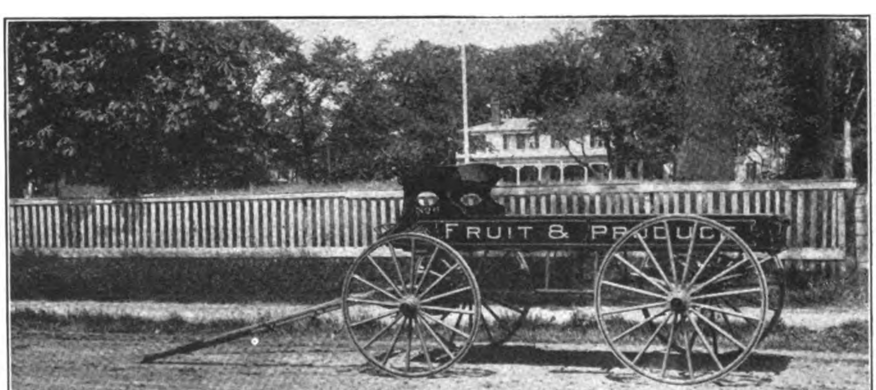
From this don't get the idea that I am encouraging a price-cutting battle. All of these suggestions are given with the idea of defense in mind. I don't for one minute encourage price-cutting, but when a competitor does cut prices legitimately—that is because his costs are lower—then it is time to get very busy with your pencil and figure hard. For this man is the hardest kind of competitor. The smith who cuts prices without regard to costs will sooner or later be driven to the wall. But the smith who knows his costs perfectly, figures on a certain profit and undersells you, can stay in business just as long as you can, and perhaps longer.

And to meet this competition, feature work that pays you a good profit. Push a sideline that carries a good margin. Figure on turning your money for stock and supplies oftener. Take an example from the larger businesses, study their methods of meeting competition. If competition is strong on some sideline meet it by handling a line as near like it as possible. Handle a cheaper line in a small way, but push the standard lines and makes upon which you must depend for profit.

When tempted to buy in large quantities, remember that the better price that is sometimes possible, because of buying in quantity, is sometimes more than absorbed by the interest on the money invested. It would be better by far to buy in smaller quantities, turn the stock over quickly and use your money oftener. If you are in close touch

THE BLACKSMITH'S WAGE VS. OTHER SKILLED METALWORKERS'

	Blacksmiths	Boilermakers	Molders	Machinists	Patternmakers
Chicago	35 –42	33½–40	39	33 –42	35 –45
Baltimore	28 –35	30 –35	32	33	30 –[illegible]
Detroit	30 –50	25 –32½	36	15 –50	35 –45
St. Louis	31 –41	40	37	35 –45	44 –45
Newark	30	36	39	25 –30	22 –30
Buffalo	30	34 –40	30	30 –35	35 –50
New York	33½–42	36	39	28 –41⅔	33½–44
Cincinnati	28	....	35	....	35 –42
Cleveland	27½–30	30	36	27½–32½	32 –35
Philadelphia	27 –37	33 –35	36	27½	32½–46
Pittsburgh	20 –35	....	39	40 –42	42
Milwaukee	40	33 –35	32	32 –37½	35 –37½



A SAMPLE OF VEHICLE WORK FROM MAINE—MR. C. W. HUFF, BUILDER

with the needs of your customers you can easily arrange to buy closer and use your money two or three times instead of once.

This has been rather a rambling discussion on the relationship of cost-knowledge and competition, but I could only touch on the important points; leaving the particulars to be worked out. In my next article I will, by request, discuss the matter of catalog-house competition.

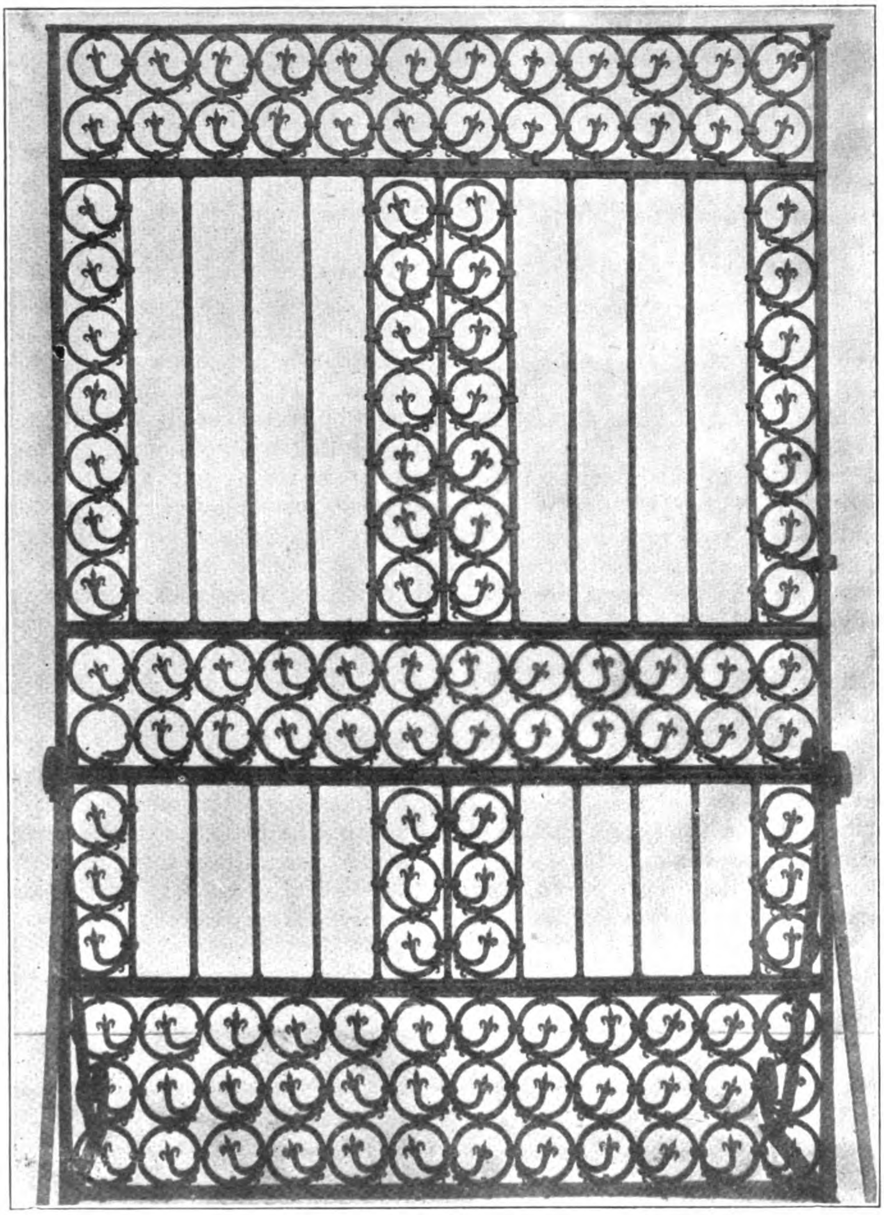
(To be continued)

NOTE:—This new series of articles by Thornton seems to be striking a popular vein. The subject of competition is one that is close to the business heart of every shop-owning smith, and in these articles the subject will be very thoroughly discussed in each of its many phases. In his next installment, Thornton discusses catalog-house competition and how the smith can meet catalog-house arguments. Readers are invited to reply to any of Thornton's articles or to ask for any specific information not covered in the articles. EDITOR.

Something About Ornamental Work in Italy

The two accompanying engravings show examples of Italian hand-wrought work. The grille, the larger piece, is of the thirteenth century, and the gates are of the fifteenth century.

The thing that impresses the observer most when examining and analyzing Italian work in contrast with German, French or Spanish productions is its remarkable simplicity in appearance. The Italian work is peculiar to itself. It is free from over-ornamentation and tastefully simple. It stands out distinctly from the iron work of the countries of Europe, though it does not carry with it that richness or grandeur that characterizes the work of the German, French and Spanish smiths.



AN ITALIAN GRILLE OF THE THIRTEENTH CENTURY

Analysis of Italian work leads one to believe that many of the styles of architecture were not understood by the iron workers of Italy. For example, it is by no means rare to find designs in Italian hand-wrought ironwork that are more suited to and were very evidently intended for reproduction in stone.

The simplicity of the work of the Italian smiths is shown very strikingly in instances where large rings, door knockers, link holders and other articles of like nature are formed. The work is usually of the simplest form; the decoration being a simple punch design, with few if any twistings or scrolls. In many instances the designs are mere markings with a blunt chisel made upon the flat faces of the article.

The two examples of Italian work show that little change in general treatment of grille and gate work can be noted between the thirteenth and fifteenth-century work of the Italian smith. Both these articles, for example, show a repetition of one simple design—one in combination with straight barwork, the other topped with a rather fussy looking scroll design. The grille is rather pleasing in its simplicity and the entire piece is well made. The gates, however, are not an example of good composition. The panels or bodies of the gates are well made and of good proportion, but the scroll surmounting the two pieces is not related to them in any way, either in design, weight or execution. And the little scrolls added to the center portion instead of improving its appearance make the error in design so much more apparent.

Another Comparison of The Hot and Cold Method of Tire-Setting

C. W. NEEDLES

A tire set right on a poor wheel will give better results than a tire set wrong on a good wheel, and this being the case, it is essential that

the tire must be set right whether the wheel be good or bad. We are aiming in this communication to tell you how it should be done in order to do it right.

In the first place the wheel must be in perfect condition to receive the tire before the tire is put on the wheel and this perfect condition is what is the hardest for the smith to know and is the very place to start getting right.

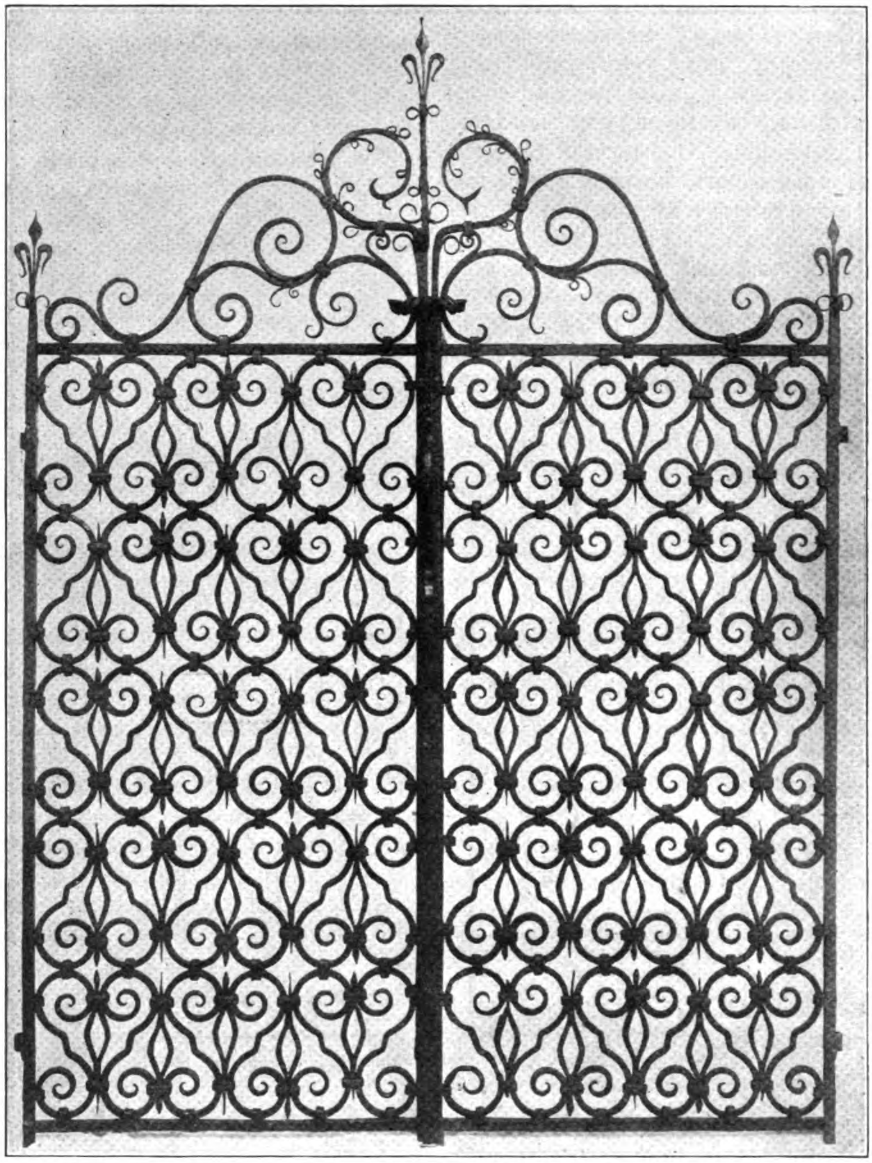
The rim must be the proper length and that means it must be just the length of the circle of the wheel. In order to know when you have attained this proper length it is necessary to draw the rim snugly up against the shoulder of each spoke. If the tenons of spokes are too small to hold felloe against shoulder of spoke, then wedge it so it will stay. If the felloe rests against each spoke shoulder, it is easy to cut the felloe or rim the proper length, which should be so that the ends of felloes or rims butt against each other tight. Of course, if any of the shoulders of spokes do not rest snug against rim, then no one can do the right kind of tire setting, because there must be some guess work and that is not permissible in good work. On heavy wheels where bent rims are used, we have a draw band which we put on the wheel and draw rim up tight against spoke shoulders and while in that condition cut the rim the right length, for if the rim is even a little too long the wheel will be rim bound and that is a bad condition.

After the wheel is in proper condition, the rest is easy for the amount of draft can vary. We usually put tires on very light wheels without any draft, but on heavy wheels we sometimes make the draft as much as $\frac{3}{4}$ of an inch, that is, we make the tire $\frac{3}{4}$ inch shorter than the circle of the wheel. The amount of draft on a $\frac{7}{8}$-inch tread wheel we think should be $\frac{1}{16}$ inch when tire is cold. This usually means the heat that is in the tire after welding or upsetting and this draft we vary up to $\frac{3}{4}$ of an inch on lumber wagon wheels when setting tires on new wheels, but would never think of having this much draft on old lumber wagon wheels.

Our method of tire setting would preferably be the old-fashioned way, as we do not believe the cold tire setter is practical for good tire setting and we will give you our reasons why we believe this.

The tire, after it is set on the wheel, should be the same size as wheel on very light wheels and smaller than wheel on heavier wheels, because in order to do the wheel any good the tire must have a set or draw. In the old-fashioned way we can attain this set or draw and it is a question based on facts and well defined mechanical principles, that it cannot be done on any cold tire setter made, because you cannot make the tire smaller than the wheel. When you are upsetting the tire around the wheel as they do on the cold tire setter, there is no question but you can upset the tire cold, but when you go just so far you also upset the wheel, driving the spokes into the felloe, crushing the wood thereby damaging it, which you cannot do setting in the old fashioned way.

Then again, there is the rebound in upsetting cold and this rebound is just enough to cause your tire to be larger than the wheel after the cold tire setter has done the best it can do. If anyone doubts my word on this, let him take his cold tire setter and set the tire as tight as he can and then knock the tire off the wheel. He can do this easy enough. And then measure the wheel and tire and you will see that the tire is larger than the wheel, proving emphatically that the tire had no set or draft. In the large wagon factories where they use the cold tire setter they heat the tire just enough to overcome this rebound. This takes the cold process away from the cold tire setter and they do not attain as good results as in the old fashioned hot method.

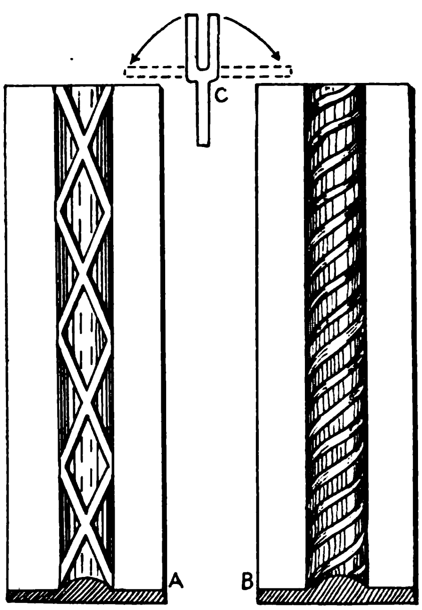


A SPECIMEN OF ITALIAN GATE WORK OF THE FIFTEENTH CENTURY

How to Produce Raised Work On Solid Bars For Ornamentation

BERT HILLYER

This is oftentimes used for ornamental work. A smith will see a solid form of beading raised on a flat surface. This will be found mostly on ancient iron work, and the raised part will be so true and even that it may be a mystery to some how it can be done. One form of beading is a raised part, forming a row of diamond shapes running the entire length, showing the full diamond on the top and half diamond on the sides, as at A. To make this take two pieces of 3/8-inch or 1/4-inch square soft steel, or whatever size you want the bead. In this case we



HOW TO PRODUCE RAISED WORK ON SOLID BARS FOR ORNAMENTATION

will say two 3/8-inch pieces, 10 inches long. Heat one piece evenly for its entire length and take to the vise. After fastening one end in the vise twist the piece around four times to the right. Then take the other piece and twist it the same number of times to the *left*. The number of twists can be left to the fancy of the reader, but they must be the same number of times each way. Now take a plate of soft steel about 1 by 3 inches and 6 feet long; heat to a good clean heat, scrape the scales off and lay a piece of 3/8-inch round soft steel on top and sink a light impression in the plate. If any scales are left in the impression, brush them out. Then place one of the twisted pieces in the groove and sink it in part way. Take the other piece and do the same way; laying it so that the ridges of the twists cross evenly. This makes the tool complete. The sinking part is best done with light blows from a steam hammer, but can be done on the anvil with flatter and sledge. Now take a piece of round iron or soft steel, hot, and drive down in the impression of tool, and it will come out as at A, only far better looking.

The beaded plate at B is made the same way, but only one twist is used. These beads can be made in rings or irregular shapes, but the plain, straight shape I think would be more easily understood.

If a plate is not wanted on the work, a small piece of round iron is taken which will just fill up the groove in the tool, and when hammered down will come flush with the top. In making the tool, different twists can be used, such as in square iron, hexagon, octagon, two round pieces twisted together and so on, or that which suits the fancy of the reader.

In making ornamental pieces that have a stem in the center, like spurs, a hole is drilled in the center of the groove in the tool. A piece is forged and split, and then the ends are thrown down in T-shape, as dotted lines show at C. The piece is made hot, the stem put through the hole in tool, and top hammered down, which gives it the impression in the tool.

Blacksmithing and Politics

The following from the Utica (N. Y.), Press will interest every reader of "Our Journal." No matter what your politics, or whether you have any at all, the fact that the item carries with it the odor of the forge and the atmosphere of the typical village smithy is reason sufficient for your interest.

To the Editor:

Nearly all day long the blacksmith had been rushed with work, various odd jobs coming in besides that of horseshoeing. He was a master at his trade, and whatever he did was done with an honest intent of doing it well, the result being that when others were idle he had plenty to do. The last job had been finished and left the shop, when with a sigh of relief, the blacksmith, for the first time during the day, seated himself in a chair and, wiping the grime from his face remarked: "I'm not as young as I used t' be, an' I find my work sort of wearin' on me, an' some day someone else'll have t' take my place. There ain't anything to it at present prices, take int' consideration th' price of iron an' th' high cost of livin'. In fact, did you ever know a blacksmith t' get rich an' be a bloated bondholder? But what I'm thinkin' of is where they'r comin' from—them t' take our place when th' old stock plays out. Do you see any young fellers learnin' th' trade anywhere in any th' shops? No, not any. They'r all after easy jobs an' big pay—politics, for instance, seems t' draw them. Where there's one learnin' some useful trade there's a thousan' pushin' for a political job an' th' pickin's that's expected t' go with it. It's all politics, nothin' but politics, an' this same thing's goin' to ruin this country yet, 'cordin' t' my way of thinkin.' It's destroyin' all moral obligations an' sense of honesty an' loyalty t' country; an' in its place an' insane greed for power an' consequent reachin' out for graft an' th' pilin' up of millions, an' high taxation 'll be restin' on th' middle class. Taxes an' th' cost of livin'll go up higher an' higher an' th' load'll get heavier an' more heavy. An' how will it be with our young men, them that's learned no trade, but depended on politics? When one gets t' be high up in th' game, ten thousan' become drift wood on th' tide of labor an' usefulness. Why? Because when a tool becomes dull or a different or a better one is found th' old one is thrown aside. There's lots of new, sharp tools at hand, an' no time's wasted in sharpenin' old ones. They'r laid on th' shelf where they'll rust out an' finally go into th' junk pile. There's where we'll find them that go in t' politics—on th' old junk pile. Yes, th' beef trust has won out now that a national 'lection campaign's comin' on. It was so t' be expected. Do you 'spose they was goin' t' put up a few hundred thousan' 'less they got value receiv'd? Th' trusts has got t' be protected. 'Lection costs money, heaps of it some times, as per Stephenson an' Lorimer t' th' Senate; which goes t' show no honest (?) man can't get on without it. Th' beef trust trial was gigantic. Tons an' tons of evidence was interduced an' piled up an' more come in an' was piled on that. An' then more was fetch'd in. Th' jury set an' kept watch when they wasn't asleep. Th' evidence an' th' law was sifted an' sorted an' piled up before them till their eyes ached an' their brains an' thoughts floated in a sea of fog. Of course they was ordinary human bein's, just ordinary, an' couldn't understan' so much, an' such a qual'ty of law. We couldn't if we tried. They set an' look'd an' wonder'd what it was all about an' finally give it up, an' tho't about their own affairs. When told t' retire an' decide th' case after th' defend'nts had said they wasn't guilty, that they was honest an' had hard work t' make both ends meet, they went t' th' jury room. 'Bout all they remembered of th' evidence or summin' up, when they got there, was that th' beef trust was honest an' had hard work to make both ends meet. A good many of them had th' same experience an' was sympathetic, but as fair mind'd men they'd give all a square deal. But how? They'd tost up a cent, so to say, an' it sure would come up head or tail. Heads th' pross'cution won an' tails th' defense. It was tails. 'Not guilty' said th' foreman, an' in consequence there was joy; cause both th' government an' th' beef trust had won out. The first would be sure where campaign funds were comin' from, an' th' other that they would go on protected. But how about th' people? They lose of course, but they be dam'd. It's politics that's bein' pla'd. Th' sugar trust was pross'cuted, an' sugar went up. Th' beef trust now sends up th' price of meat, an' th' people have t' pay th' cost. Long live th' trusts! They pay heavily into th'

campaign fund an' why shouldn't they be protected? No protection, no pay!

"Shoe your horse? Yes, bring him in," and the blacksmith rose wearily from his chair, while I left the shop, thinking of what I had heard.

A. B. Le Clare, Camden, N. Y.

Drop-Forging In the Railroad Smith Shop

H. E. Gamble

Many railroad shops are so full of other machinery that we are confident the change to drop-forging would be a benefit, providing the tool cost could be regulated and the dies made by men who are familiar with this class of work to produce the desired results. Make the die correct and have the capacity in strength of hammer to produce the forging desired.

I have had experience with the high-grade steel dies and also the low-grade tool steel dies. The material for the die must be judged by the forging to be produced from the die, as the cost of the article to be produced would pay for die service and output.

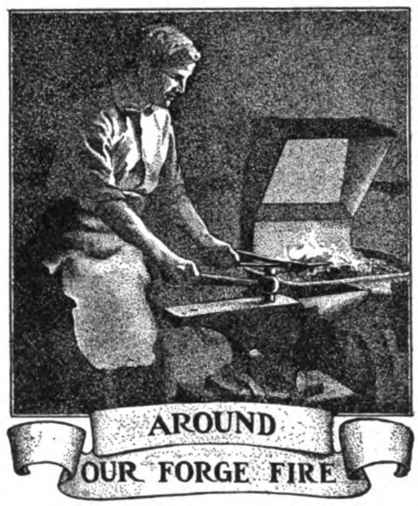
You have some men who say that the rod-breaks in drop-forge shops are too numerous to mention. It may be true that we have this trouble, but I claim that these breaks occur from overtaxing the hammer and from poor material in the rods. I find that in this line experience is the best teacher. "Rome was not built in one day," and the drop-hammer cannot stand forever without some breaks, caused by poor heating and the hammers not being heavy enough to produce the work put under them.

Care and judgment should be exercised by the foreman and the die-maker in using the proper amount of material to produce the part desired, so that the dies will not be overcrowded with surplus material. This will keep down the cost of the article and reduce die repairs.

Plenty of work, good experienced men and up-to-date hammers and furnaces cannot help but pay.

The art of forging with drop-hammers which may be designated as "Machine Blacksmithing," developed about 1853, when Col. Samuel Colt adopted these machines to make parts for firearms. They have since been greatly improved, and the products of the drop-forging industry are now used in a great variety of mechanical arts.

We have at this time in the Juniata shop of the Pennsylvania Railroad Company one 6000-pound, one 3000-pound and two 1500-pound drop-hammers, and they are able to produce work ranging in weight from one half ounce to ninety pounds; including locomotive, car and electric baggage truck forgings, and any parts that can possibly be made under the drop-hammer.



The Editor was busy reading his morning's mail when the door opened and a stranger sauntered in. The Editor greeted his caller with a cheery "Good morning, sir", and waited for the man to tell his business.

"Guess you don't remember me," began the stranger. "It's some time since I've smoked a cigar of yours, but I thought you'd know me. You perhaps think I'm still down east, holding down a soft snap as foreman of the Shoe Fly Horseshoeing and Blacksmithing Company."

The Editor's face brightened. "Well, Jim! I didn't know you. What did they do to you?" Then, continuing, "I suppose it's a long story. Here, light one of these, fall into that chair and let me have the story from start to finish. Last time I heard from you you were working for a concern down east somewhere, and they had just made you a fine proposition on a profit-sharing or some other basis."

The Editor's visitor lighted the proffered cigar and settled back in an easy chair to tell his story.

"Well, you know, Mr. Editor, I've had some experience in blacksmithing and I thought it was about time to cash in on some of my knowledge and experience. In kickin' around from one end of the country to the other I learned a lot, but didn't manage to hold onto a very great many of our Uncle Sam's iron men. So when I got an offer from the Shoe Fly Company I grabbed it quick. The salary was fair, and they promised a very nice boost if I made good.

"Here I had an advantage that I never had in most of the shops I had worked in, and that was that anything I did was an improvement. They had an equipment that would be an improvement at Tom Tardy's. So I can't say that I didn't have a chance.

"Well, everything went along fine until the time came for the boost to make itself known. About that time the boss of the outfit got busy with pencil and some paper and, seeing what a mountain (?) of cold coin he would need to pry off every month in order to give me a fair salary, he doped up a new proposition. He handed me a lot of gush about the fine work I had been doing, how I put the business on its feet and how it would be a shame not to reward me accordingly. So he had figured out a very nice plan under which I was to share in the profits according to my ability to save on labor costs. This all sounded good to me; in fact, it figured out fine. Knowing conditions as I did in that shop I could figure somewhat on chances for labor saving, and from the figures I got I could almost see a fine little house all paid for, with a garage in the back yard.

"For the next year I plugged harder than ever. True, I pulled down the same number of simoleons in the weekly envelope, but I was looking at the big, fat roll that was sure to come after the year was up. I showed some cost slips that must have made the boss think I was a wonder. I pared them down so fine that I often got to wondering how long I could continue.

"So things went on for the second year. It came time for the reckoning, and while on my way to the office to figure out matters with the boss I imagined myself already at the wheel of a classy runabout. Well, the gray matter supposed to be in the skull cavity of Mr. Boss must have gotten misplaced, because his viewpoint of matters relating to Uncle Sam's coinage was very much perverted. In other words, when he saw the figure he would have to hand over under the profit-sharing plan he had a very bad attack of heart failure and, when he recovered, his vision was affected, so that he saw only the sum rightly coming to me, but he could not see the sum showing the saving in labor cost which, by the way, was five times as large.

"I saw then just what kind of man I was trying to pull with, so when he offered instead of the money properly coming to me an ordinary boost in salary I told him what I thought of him and cut my traces. And that's why I'm down here talking to you."

"There's one consolation, Jim," said the Editor, when his visitor finished. "You are not the only man that has been served with a deal of that kind. Some firms just can't let go of some of the money saved by the men they employ."

"I ran up against mild cases of the same kind, but never saw such a near-sighted money-worshiper before," the Editor's visitor resumed. "It seems strange that a man should not be willing to give you a fifth of the money you find for him. If I found a hundred on the street and returned it to the owner he should certainly be willing to give me a fifth of it. But in this case I was finding and saving the man a hundred he had never had—and he wanted it all. He wasn't willing to hand over even twenty of it to the man who saved it for him."

"Well, let's forget about it in a good lunch," said the Editor, rising. "You can certainly enjoy a good feed, even if you are out of a job and feeling bad about the last job you held down."

"You mean held me up, don't you?" queried Jim, laughingly, as they went out.

The Heroes Of The Titanic

CHARLES J. JONES

They said, "There are no more heroes, for
the day of the brave is done,
And the knights have ridden away to death,
unshrinking, one by one."
They said, "Have done with thy dreaming
—the fires of our faith are a-cold;
For we are a little people, and our honors
are touched with gold."
They said, "There is no more courage, for
the past comes never again,
And our mills grind power to traders, but
they cannot grind us men."
But there was the wrecked Titanic in the
dark where the fog-wraith whirled,
And the answer heard by the great, gray
berg thunders around the world.

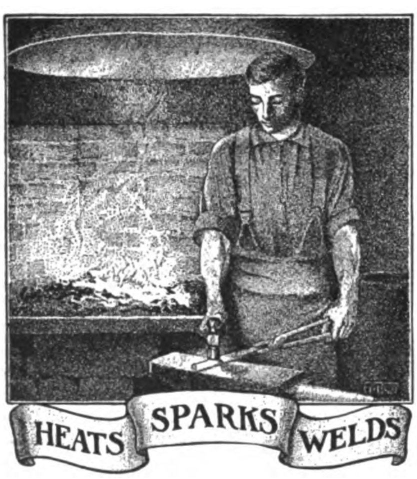
* * * * * *

Did one stand out by the guard rail and
think that a cooler breath
Blew past his face from the deep beyond?
Ah, that was the wing of death!
She struck with a fearful, crunching roar,
and as the shudder passed
High up on the bridge with muscles tense
a white-faced man stood fast.
The jar of the closing bulkheads was drowned
in the tramp of the feet
Of those who thronged to the open air
they knew not what to meet;
Then flashed in the night the wireless
spark, and each man guessed at the
worst,
But each man stood to his duty plain:
"Women and children first!"

Then came to the last leal parting a man
and his life-long bride,
Then dropped from the creaking davits
swift that lifeboat overside;
There came no spark from the wireless
more, the lights drooped down to die,
But true through that black, disastrous
time God's fire in man flamed high;
And there was a sound of sobbing dread,
of grief too deep to name,
When up from the crowded steerage deck
the strange clad women came;
There rose a shriek from the outer dark,
the cold wind bore it on—
A dry sob answered it from the deck, and
the last lifeboat was gone.

She sinks by the head!—then forward
bound slid down an empty chair;
But men stand up to the last great fight—
there was no craven there.
She sinks by the head!—those steady eyes
gave answer, rank on rank—
A choked good-by—and the great whirl-
pool sucked downward where she sank.
Down, down, to the heavy, soundless dark
—no man of might nor of mind,
No rich, no poor, but simply men who die
for their womenkind.
The white man's crown and glorious fame,
his honor's charge to keep—
God rest their souls whose souls were found
still fearless of His deep!

They said, "There are no more heroes, for
the past comes never again,
And our mills grind power to traders, but
they cannot make us men."
But there was the blind Titanic, and there
was a berg accursed,
And there were the men who dared to say:
"Women and children first."
They have called us a little people with our
traders' souls and small,
But the men who died on that drowning
ship make answer, one and all;
For their kind has come to conquer all—
yea, even to chain the seas.
Great God! What thing may a race not
do that is kin to men like these!



Have you ordered that engine yet?

A fat purse is kept so by short credits.

When courtesy flies out of the window, a job flies out of the door.

Don't forget the Pink Buffalo Stamps—they're free, they're useful, they're plentiful. Ask for a new lot if your supply is low.

The best preventative of rust on tools is frequent use—the best preventative of stiff joints is constant activity.

"The shoemaker's children go barefoot", runs the old proverb. And in the smith's house you find the worst knives.

Often the best and many times the only way—have you a lawyer to take care of bad accounts?

Friends make trade, and a bright, cheery, good natured man makes friends easily. Cheerfulness is an excellent trade cultivator.

And while the raising of the mortgage is a vital matter, don't forget your obligations to the children. Raising a good family properly is of some importance also.

Don't forget the garden. A few minutes night and morning close to nature will repay you in vigor and vim and in appreciation of God's green earth.

"The same is true of men", said Mrs. Tardy, when we said it is harder to feed an idle horse than one that is being worked hard every day.

With tool steel the cry is "Don't overheat." With high-speed, "Get it hot enough." What is a man to do? Know your steel and then know how to work it.

Examine your shop indicator occasionally. It will tell you things about yourself that you won't admit. And a scrap pile may indicate an economical or an extravagant workman.

It's not so much the doing of work quickly that counts for success as it is the working continuously and persistently. The man who keeps everlastingly at it has the advantage over the spasmodic chap.

The longer you put off that disagreeable job, the harder it becomes. Dispose of the hard jobs first—then you'll have them off your mind when doing jobs that you like.

A good all-round welding compound is made by mixing one pound of sal-ammoniac with four pounds of borax. Melt the mixture and, when cool, powder it finely and use same as borax.

Try tempering small drills, screw drivers and the like by cooling in a bar of common soap. An old tool smith recommends it—says it makes the hardness about right without the necessity of drawing the temper.

A Good Opportunity awaits a young man at Edom, Virginia. A retiring blacksmith with a fine shop, fully equipped, wishes to turn over his business to a young, ambitious craftsman. For further particulars address Mr. C. H. Masters.

Let records in black and white tell you which way you are headed on the business road. There is no arguing with business books kept in a business way. And we don't want to go backward, for there is now too much competition in that direction

Remember, you can extend your own subscription without making a cash payment. Send in one new subscriber and we will give you six months' credit. For two new ones we will extend your subscription one whole year.

Readers with a child-raising problem will be interested in Prof. McKeever's latest home training bulletin No. 8, "Instructing the Young in Regard to Sex." Send a two cent stamp to Prof. Wm. A. McKeever, Manhattan, Kansas, and mention THE AMERICAN BLACKSMITH.

Perhaps the most unique monument to mark a grave is that for the grave of Mr. M. Sias, a former blacksmith whose body lies in a Kansas cemetery. The marker consists of an anvil fastened to an anvil block, and upon the anvil face rest the tongs and hammer.

Have you cleaned up the old trash lying around outside the shop? Now is a good time to clean up. Save out the good material, but do throw the worthless material away. Don't allow the good appearance of the shop to be marred by a miscellaneous collection of old buggies, sleighs, farming implements and old boilers. Clean up! Clean up!

Don't forget the little provision for the rainy day. A little now and then put into the bank will take care of you when you need it most. And a good idea is to deposit the money in both your own and your wife's names. Then she will have no difficulty and experience no delays if anything happens to you. But most important of all is to get the money into the bank. Remember, "Little and often fills the purse."

Every issue contains a statement regarding our policy toward unreliable advertisers. Look up the Honest Dealings paragraph. It has stood for over ten years. Fakers and rogues cannot knowingly purchase space in "Our Journal" at any price. Patent medicine, liquor, or any other undesirable advertising, is kept out without reserve. And the Pink Buffalo Stamps back up the Honest Dealings paragraph. They make a winning pair.

From the thousands of letters of praise and of commendation received during the ten years and more of "Our Journal's" existence the one recently received from the wife of a Wisconsin smith stands out like an oasis in the desert. This woman writes as follows:

> "Yours is an excellent paper. It stands in every way for purity, cleanliness and temperance, and its pages express many little uplifting thoughts. We wish you every success."

Such praise makes us feel that our fight for craft betterment has not been for naught—it makes us feel like taking a new grip and continuing the fight with renewed vigor. Of course you are fighting with us and not against us.

Our Honor Roll

Thirty-Three New Names

Since last month thirty-three new names have been added to Our Honor Roll—names that have not previously had a place. And, in consequence, we have had to take February, 1915, off the list.

Every month the roll is becoming more crowded and every month makes a position on the roll more difficult of attainment. Better figure out a position for yourself, now. If your account expires this month—June, 1912—a remittance of $5.00 (or $7.00 or 1£. 14s.) will put you among the leaders and pay your account up to June, 1922. Sharpen up your pencil and get busy. And, while figuring, don't forget the *saving* you make.

	U. S. and Mexico	Canada	Other Countries
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s.

And then, too, you can gain a place on Our Honor Roll by getting new subscribers. Just show this big list of honor readers to your brother craftsmen. A paper must be pretty good to get a practical man's subscription years and years in advance. Then send in the new subscription orders and we will give you six months' credit on your own account for each new order you send us. That will help you toward an honor place. Will you tell your neighbor?

NAME	Subscription Paid to
W. C. Watt, Kan.	Dec., 1930
I. J. Stites, N. J.	Jan., 1928
W. R. Turner, Man.	Oct., 1923
T. Bradley, N. S. Wales.	Mar., 1923
W. Lawson, N. Z.	Nov., 1922
A. Pfeiffer, Ohio	Aug., 1922
S. Smith, Tex.	Apr., 1922
D. W. Smith, R. I.	Mar., 1922
R. H. Keith, Ia.	Jan., 1922
O. M. Johnson, Minn.	Oct., 1921
H. Feldus, Neb.	Sept., 1921
W. K. Kline, Kan.	May, 1921
R. S. Crisler, Ky.	Jan., 1920
I. M. Townsend, Cal.	Apr., 1919
C. Williams, W. Aus.	Mar., 1919
T. P. Considine, Mass.	Dec., 1918
Richard Brenner, Tex.	Feb., 1918
W. F. Hill, N. C.	Feb., 1918
P. J. Dally, W. Aus.	Jan., 1918
J. Morrow, Pa.	Jan., 1918
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, N. Dak.	Nov., 1917
W. C. Roney, Pa.	Oct., 1917
J. N. Miles, Ky.	Oct., 1917
H. Ferrel, Ill.	Aug., 1917
J. McMeeken, N. Z.	Aug., 1917
Yost & Halvorson, Minn.	May, 1917
W. McCoy, Kan.	May, 1917
A. Guettler, Tex.	May, 1917
E. Thibaudeau, Wis.	Apr., 1917
W. Pickering, S. Africa	Apr., 1917
Ed. Burrows, England	Apr., 1917
L. Kausch, Wis.	Apr., 1917
J. M. Brown, Texas	Apr., 1917
J. C. Woods, W. Aus.	Mar., 1917
C. Boulton, N. S. Wales.	Mar., 1917
C. A. Hawkins, Ore.	Mar., 1917
A. L. Monycott, W. Va.	Mar., 1917
J. Peterson, Ia.	Mar., 1917
J. Anderson, Tas.	Mar., 1917
A. J. Neill, Vt.	Mar., 1917
Ed. Deitrich, Ind	Mar., 1917
Lewis Chase, N. Y	Mar., 1917
E. O. Lee, S. Dak.	Mar., 1917
S. Stemple, Ohio	Mar., 1917
R. S. Gugisberg, Kan.	Mar., 1917
J. S. Haskell, Col.	Mar., 1917
W. L. Roark, Tex.	Mar., 1917
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M. E. Goller, Pa.	Feb., 1917
J. Potthoff, Neb.	Feb., 1917
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L. V. Senn, Neb.	Jan., 1917
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H. Kahl, Ia.	Jan., 1917
J. H. Bergen, Kan.	Jan., 1917
F. G. A. Williams, S. Aus.	Jan., 1917
H. Grimm, Utah	Dec., 1916

NAME	Subscription Paid to
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C. J. Hall, Wash.	Dec., 1916
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Joeris Bros., Tex.	Dec., 1916
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Scheffley & Schmitt, Pa.	Dec., 1916
A. Brause, Ohio	Dec., 1916
J. E. Beatty, Mo.	Dec., 1916
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G. Lindborg, Ind.	Nov., 1916
Pittman Stell, N. C.	Nov., 1916
J. S. Finkenbiner, Ind.	Nov., 1916
R. D. Wixom, N. Y.	Nov., 1916
E. A. Knapp, N. Z.	Oct., 1916
T. J. Haskins, N. S. W.	Oct., 1916
Lothian & Skinner, N.S.W.	Oct., 1916
W. B. Knouff, Ala.	Oct., 1916
Gorham Bros., Ia.	Oct., 1916
W. H. F. Brauch, N. C.	Oct., 1916
Clark Olds & Co., Neb.	Oct., 1916
Irwin Scott, N. Y.	Oct., 1916
C. E. Durham, Kan.	Oct., 1916
M. Ringo, S. Africa	Oct., 1916
W. Delley, Queens, Aus.	Oct., 1916
J. J. Iler, N. S. Wales	Sept., 1916
James Poettgen & Co., Mo.	Sept., 1916
Jno. Goettinger, Ia.	Sept., 1916
Geo. Fleckenstein, Cal.	Sept., 1916
Geo. Hill, Aus.	Sept., 1916
E. C. Beard, Aus.	Sept., 1916
J. K. Glinicki, Mich.	Sept., 1916
Oscar Buhner, Md.	Sept., 1916
A. J. Hammond, Cal.	Sept., 1916
Robert Murray, Cal.	Sept., 1916
D. E. Wright, Pa.	Sept., 1916
J. S. Haskell, Col.	Sept., 1916
R. Sommer, Aus.	Sept., 1916
J. A. Sequin, Can.	Aug., 1916
James Clarke, Jr., Aus.	Aug., 1916
Dispatch Fdy. Ltd., N. Z.	Aug., 1916
J. W. Fowler, N. Z.	July, 1916
A. C. Lodwig, Cal.	July, 1916
A. A. Bahlke, Mich.	July, 1916
J. K. Hansen, Aus.	July, 1916
J. B. Barker, Ill.	July, 1916
H. M. Larsen, Wis.	July, 1916

NAME	Subscription Paid to
Geo. P. MacIntyre, Me.	July, 1916
Jas. A. Buchner, Mich.	July, 1916
G. R. Harrison, Aus.	June, 1916
J. Waycich, S. Africa	June, 1916
W. Voight, S. Africa	June, 1916
Martin Jensen, Wis.	June, 1916
Chester Humbert, Wis.	June, 1916
Lincoln Underhill, Cal.	June, 1916
M. Broton, N. Dak.	June, 1916
Hans Eriksen, Ill.	June, 1916
C. Morrell, N. Brunswick.	June, 1916
J. O. Conrad, Kan.	June, 1916
Adam Schmitt, Mich.	June, 1916
James Sinclair, W. Aus.	May, 1916
H. Baker, Aus.	May, 1916
E. Q. Krehbiel, Kan.	May, 1916
C. H. Cairns, N. Y.	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vt.	May, 1916
C. A. Stebbins, Kan.	May, 1916
Sanford Baker, Mo.	May, 1916
P. A. Peterson, Ia.	Apr., 1916
G. F. Bowers, Okla.	Apr., 1916
D. E. McDonald, Fla.	Apr., 1916
James Baxter, S. Africa	Apr., 1916
E. P. Dignan, S. Aus.	Apr., 1916
W. H. Winget, Vt.	Apr., 1916
C. Schmid, Neb.	Mar., 1916
A. Rockenschup & Son, La.	Mar., 1916
C. H. Alexander, N. Y.	Mar., 1916
A. M. Harebo, Wis.	Mar., 1916
George Howard, Kan.	Mar., 1916
G. N. Follmar, Neb.	Mar., 1916
W. Willoughby, Mich.	Mar., 1916
H. Hoffmeyer, N. J.	Mar., 1916
Frank L. Locke, N. Y.	Mar., 1916
Frank L. Evarts, Conn.	Mar., 1916
C. R. Winget, Vt.	Mar., 1916
H. & J. Chisholm, N. Z.	Mar., 1916
C. F. Molkenten, Aus.	Mar., 1916
H. D. Phillips, S. Aus.	Mar., 1916
J. B. Fry, Wash.	Mar., 1916
L. A. Downing, Cal.	Mar., 1916
A. A. Schreiber, Tex.	Feb., 1916
J. T. Dillard, Tex.	Feb., 1916
F. J. Flessel, N. Y.	Feb., 1916
E. P. Jones, Kan.	Feb., 1916
E. J. Bishop, N. Y.	Feb., 1916
J. N. Tyler, Ohio	Feb., 1916
Chas. H. Kern, Ill.	Jan., 1916
J. H. Ecroyd, Cal.	Jan., 1916
Thomas Horne, Ariz.	Jan., 1916
Charles Tucker, Mich.	Jan., 1916
M. Klitgord, N. Y.	Jan., 1916
O. Stenning, S. Dak.	Jan., 1916
Iver Johnson Arms and Cycle Works, Mass.	Jan., 1916
Feldmeyer & Schaake, Kan	Jan., 1916
Chas. Winter, Cal.	Dec., 1915
E. J. Bufe, Ia.	Dec., 1915
Geo. Sykes, Aus.	Dec., 1915
W. Patrick, N. Y.	Dec., 1915
Jas. A. Sharp, Mass.	Dec., 1915
J. Krahulec, Ill.	Dec., 1915
P. E. Dahlfurst, Cal.	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Neb.	Dec., 1915
G. S. Fisher, Neb.	Dec., 1915
Printers Supply Company, Neb	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Va.	Dec., 1915
C. J. Ash, Kan.	Dec., 1915
F. H. Joslin, Mass.	Dec., 1915
C. W. Ames, Mass.	Dec., 1915
C. L. Sorensen, Neb	Dec., 1915
E. Williams, N. Y.	Dec., 1915
W. Urquhart, N. Z.	Dec., 1915
W. Rupe, Kan.	Dec., 1915
L. S. Kocher, Ia.	Dec., 1915
P. W. Frazer, N. Z.	Dec., 1915
J. F. Shimanek, Md.	Dec., 1915
J. P. Carrick, Ind.	Nov., 1915
D. Codere, Ill.	Nov., 1915
F. S. Woody, Ia.	Nov., 1915
George H. Ilsley, Mass.	Nov., 1915
M. I. Huff, Mo.	Nov., 1915
Stephen Wachter, Pa.	Nov., 1915
C. J. Willard, Ill.	Nov., 1915
J. S. Lee, Wash.	Nov., 1915
L. P. Mortensen, Mich.	Nov., 1915
W. Foulkes, England	Oct., 1915
N. W. Hammond, Col.	Oct., 1915
P. G. Dairdson, N. Dak.	Oct., 1915
C. N. Mills, Cal.	Oct., 1915
H. Dier, S. Aus.	Oct., 1915
S. B. Goodsell, Conn.	Oct., 1915
D. F. Hallowell, Ia.	Oct., 1915
A. Roth, Ill.	Oct., 1915
C. C. Perry, Aus.	Oct., 1915
Sidney Stevens Imp. Co., U.	Oct., 1915
W. H. Findlay, N. Z.	Oct., 1915
R. F. Watson, Cal.	Oct., 1915
H. R. Stone, Conn.	Oct., 1915
F. Teuber, Ga.	Oct., 1915
S. W. Winch, Vt.	Sept., 1915
Ed. Hammill, Cal.	Sept., 1915
R. D. Simkins, Pa.	Sept., 1915
T. J. Reynolds, Pa.	Sept., 1915
Wm. Bates, Tex.	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, W. Va.	Sept., 1915
Hugh L. Lynn, Ky.	Sept., 1915
Advance Blacksmith Co., Mo	Aug., 1915

NAME	Subscription Paid to
A. Chargois, Queens'd, Aus.	Aug., 1915
A. M. Byfield, W. Aus.	Aug., 1915
C. E. Allen, Neb.	Aug., 1915
M. J. Roder, Mont.	Aug., 1915
J. E. Lyon, Tex.	Aug., 1915
F. W. Krenz, Cal.	Aug., 1915
J. W. Storment, Ill.	Aug., 1915
Jos. P. Rotolinski, Mass.	Aug., 1915
T. O. Chittenden, N. Z.	July, 1915
The Goldfields Diamond Drilling Co., Aus.	July, 1915
J. A. Lawton & Sons, S. Aus.	July, 1915
W. C. Jones, N. C.	July, 1915
J. Picotte, Yukon Ter.	July, 1915
George M. Ferree, Ut.	July, 1915
T. S. Finnigan, Vic., Aus.	July, 1915
S. A. Stilles, Ohio	June, 1915
E. L. Herring, Fla.	June, 1915
G. R. Twedell, Miss.	June, 1915
H. P. Houghton, Ill.	June, 1915
J. W. Ivie, Ut.	June, 1915
B. A. Parker, Ga.	May, 1915
J. C. Klein, Miss.	May, 1915
N. B. Demarest, N. J.	May, 1915
E. E. Mercer, Kan.	May, 1915
Schintgen & Maier, Minn.	May, 1915
A. E. Spangberg, Ore.	May, 1915
W. S. Helmecke, Tex.	May, 1915
F. F. Putnam, Pa.	May, 1915
Otto Siebler, Tex.	May, 1915
W. A. Matson, Ut.	May, 1915
A. Seewald, Ill.	Apr., 1915
E. N. Harris, N. Y.	Apr., 1915
W. L. Whitebread, Aus.	Apr., 1915
I. P. Chiappa, Bermuda Is.	Apr., 1915
C. Isaacs, Cal.	Apr., 1915
P. Himes, Ore.	Apr., 1915
D. E. Fish, Ore.	Apr., 1915
W. M. McCurdy, Ore.	Apr., 1915
C. Schmidt, S. Dak.	Apr., 1915
R. E. Bethick, Pa.	Apr., 1915
Otto Brandt, Tex.	Apr., 1915
Morris & Gezek, Tex.	Apr., 1915
C. M. Woodden, S. Dak.	Apr., 1915
G. Gartner, N. J.	Apr., 1915
John Reeff, N. Dak.	Apr., 1915
J. D. Carrico, Ind.	Apr., 1915
H. T. Rutter, Pa.	Apr., 1915
W. M. Cummins, Pa.	Apr., 1915
D. M. Kile, Okla.	Apr., 1915
C. W. Brenell, Cal.	Apr., 1915
Geo. Vandersee, Ore.	Apr., 1915
H. H. Berry, Fla.	Apr., 1915
G. E. Grotke, Ia.	Apr., 1915
H. E. Weiss, Ia.	Apr., 1915
H. A. Langworthy, N. Y.	Apr., 1915
A. Waite, R. I.	Apr., 1915
M. Scheese, Pa.	Apr., 1915
H. S. Morris, Mo.	Apr., 1915
A. C. Frizzle, Mass.	Mar., 1915
M. Falstor, Ia.	Mar., 1915
Aug. Montrey, N. J.	Mar., 1915
C. P. Sharp, N. Y.	Mar., 1915
N. Smedbron, Wis.	Mar., 1915
E. H. Liebenstein, Wis.	Mar., 1915
J. L. Horan, N. Y.	Mar., 1915
A. G. Wolcott, Ohio	Mar., 1915
M. C. Harned, Tenn.	Mar., 1915
E. Ankerman, Ohio	Mar., 1915
J. R. Shoop, Okla.	Mar., 1915
J. Folsing, N. Y.	Mar., 1915
H. Schop, Wis.	Mar., 1915
W. D. Oliver, Ont.	Mar., 1915
Trupke & Goetter, Wis.	Mar., 1915
B. J. Herrick, Wis.	Mar., 1915
Z. M. Wesley, Ark.	Mar., 1915
C. Vogel, Neb.	Mar., 1915
J. J. Casey, Nev.	Mar., 1915
T. Frazier, N. J.	Mar., 1915
T. Beatty, N. J.	Mar., 1915
W. A. Lippincott, N. J.	Mar., 1915
G. R. Boggs, Ala.	Mar., 1915
J. H. Helmes, Cal.	Mar., 1915
R. Yuill, Ill.	Mar., 1915
J. Marshall, Ind.	Mar., 1915
W. A. Connor, Ind.	Mar., 1915
C. Lagola, Ohio	Mar., 1915
J. J. Purington, Ohio	Mar., 1915
E. B. Downey, Ohio	Mar., 1915
C. D. Camp, N. Y.	Mar., 1915
G. W. Blakey, Okla.	Mar., 1915
E. S. Sheets, Pa.	Mar., 1915
J. E. Johnson, Pa.	Mar., 1915
Van Den Wildenberg Brothers, Wis.	Mar., 1915
V. Priessnitz, Wis.	Mar., 1915
F. J. Ties, Wis.	Mar., 1915
T. E. Birchmore, Ga.	Mar., 1915
L. A. Campbell, Ia.	Mar., 1915
J. J. H. Fieriks, Minn.	Mar., 1915
J. Hiemanz, Minn.	Mar., 1915
J. L. Schurte, Mo.	Mar., 1915
University of Tennessee, Tennessee	Mar., 1915
A. Thalman, Tennessee	Mar., 1915
S. Martin, Texas	Mar., 1915
R. L. Killingsworth, Tex.	Mar., 1915
W. H. Leonard, Pa.	Mar., 1915
W. A. Shive, Pa.	Mar., 1915
R. J. McLaren, Ariz.	Mar., 1915
A. Murphy, Idaho	Mar., 1915
J. F. Prater, N. Y.	Mar., 1915
Thoreson & Stock, Wis.	Mar., 1915
C. Finzer, N. Y.	Mar., 1915
W. E. Bedford, N. W. Ter.	Mar., 1915
R. Armstrong, Ont.	Mar., 1915
J. T. Hines, Va.	Mar., 1915

Ten Questions For the Month

1. Why should heavy blows be used in working heavy stock?
2. What is the result of heating steel unevenly?
3. What is the effect of heating steel and allowing it to "soak" in the fire?
4. When hardening steel, do you heat it as high as for forging?
5. Is it necessary to know the carbon content of a steel in order to work it properly?
6. What effect will a shallow fire produce in the heating of steel?
7. When self-hardening steel is cooled in an air-blast what is the effect?
8. Why is it best to reheat steel to a certain degree, and allow it to cool slowly, after it has been worked?
9. When heating parts of a piece for hardening, how may other parts that are to remain soft be protected?
10. Which is best as a quenching medium when hardening, a cold or warm bath?

Answers To Questions in May Issue

1. Low calks are best, because they keep the foot closer to the ground, tending to preserve the moisture of the hoof and also allowing frog pressure, which is necessary to a healthy foot.
2. The foot should first be correctly prepared for the shoe, then the shoe fitted to the foot.
3. The toe weight tends to lengthen the animal's stride, i. e., the horse has a tendency to throw his foot out farther forward more quickly.
4. The bar shoe preserves frog pressure and thus produces a more natural bearing than the ordinary shoe.
5. Light shoes and, above all else, they should be of the same weight, so as not to throw the young animal out of balance.
6. The rolling motion shoe causes the animal to travel easier and increases the action. It is a good shoe in cases of stumbling.
7. The oscoronæ is the second bone of the foot from the hoof. It is between the ospedis or foot-bone and the os suffraginis or long pastern.
8. Usually called short pastern.
9. The shoe may be fitted cold, but if fitted and a bearing surface made while the shoe is at a dull heat the hoof can be properly prepared more easily and quickly. The shoe should not be hot enough to burn itself into the hoof—simply heated enough to brown the horn so as to show the high parts that are to be pared down.
10. Clips are used to keep the shoe from moving sideways and to assist the nails in holding the shoe securely on the foot.

How to Make the Knot Used In Ornamental Iron Work

Bert Hillyer

To tie a flat knot in a piece of soft steel or iron would seem to be a hard proposition owing to the stubborn nature of the metal, but the engraving shows how easily it can be done. These knots are used in ornamental iron work, and wherever placed they are bound to attract attention. At the Metropolitan Art Museum in New York City, there are examples of ornamental work containing these knots and made in the Sixteenth Century. I do not know how they were made in those ancient times, but I proceed as follows: Bend the two long pieces of soft steel in a loop as in the engraving at B, bending the loop up so that the ends will go through each loop. Now slip the ends far enough through so that they can be welded as at C. Heat up to a good heat, take to swedge block, placing two bars through loop and block, pulling opposite from one another as in at C. Pull the knot up good and tight. The ends are then cut where they are welded and spread apart as at A. These knots can be made of twisted square iron which adds to their beauty, but I would advise the reader to try one of ¼-inch round first. The knot will come out closer and better looking than the one in the engraving which was made loose so as to give a better idea of procedure. This knot can be placed in a great deal of ornamental iron work and is very attractive.

The Real Meaning of a Bill of Lading

Elton J. Buckley

Almost every business man—large or small—uses bills of lading, more or less, either by receiving them when he ships goods or having them forwarded to him when he receives goods, yet my experiences show that there is very little accurate information as to what a bill of lading really means. By most users it is looked on as a receipt, which indeed it is, but it is more—it is the sole contract between the transportation company and the person shipping the goods.

Here is a good working definition of a bill of lading: "A written acknowledgment signed and given by a railroad (or boat) company that it has received certain goods, which are described in it, from the shipper, which goods are to be transported on the terms therein expressed, to the described place of destination, there to be delivered to the consignee also named therein."

Practically all transportation companies, meaning especially railroad and steamship companies, issue bills of lading when goods are received for shipment. They are frequently written up in a very careless manner, however, and sometimes the blame for this lies with the road and sometimes it lies with the shipper. Considerable experience in these lines has taught me that the most fruitful cause of the many legal controversies which are constantly arising over the carriage of merchandise is the failure to properly describe the property shipped in the bill of lading. Railroad clerks or agents are often careless about this, but other times the shipper is at fault for not supplying sufficient details. A bill of lading should plainly contain the names of the consignor and consignee, the place of destination, and in addition to these items it should set forth a complete and adequate description of the kind, quantity, value, quality and condition of goods shipped. No shipper should accept a bill of lading which does not contain these details, provided he has supplied them to the railroad company.

A shipper can either set forth the name of the consignee in the bill of lading, or he can consign the goods to himself, including a provision to notify the person who is really the consignee upon arrival. This is frequently done in order that the shipper can keep title to the goods in himself until such time as he can safely let it go.

The law is very clear that the bill of lading is the contract between the parties, and that the shipper is bound by its contents if he accepts it, even if he doesn't read a line. And, as a matter of fact, I have never yet found a shipper who did read his bill of lading. I have many times had occasion to ask whether given shippers had read the provisions of their contract with the railroad company, but never yet have I found one who had. There may be some, but I haven't come in contact with them.

The weight of judicial decision is that the shipper who accepts a bill of lading from a railroad company—and of course he accepts it as it is his only receipt—he is bound by everything it contains, even though he doesn't sign it. This includes the fine print on the back, which he may not even see. If he accepts, the law considers that he has assented to all the terms.

The carelessness of shippers in unthinkingly allowing themselves to be put into positions like this is all the more remarkable when it is remembered that the railroad companies always introduce into their bills of lading all the provisions they can possibly crowd in there to relieve themselves of responsibility. Among these are provisions regulating the time within which claims are to be made—a point which it is vitally necessary for shippers to know.

A bill of lading is almost as negotiable—though not quite—as a promissory note. That is to say, it can be passed from hand to hand, and each time the title to the goods it represents passes with it. Usually a bill of lading is transferred by endorsement and delivery to the person who is to take it, but it can be transferred by delivery alone if the intention is to pass title to the goods.

A favorite method of transferring the bill of lading in this day is to send a draft on the consignee through some bank, attaching the bill of lading to the draft. The consignee pays the draft, and the bill of lading is delivered to him, whereupon he can go to the railroad and get the goods.

A railroad will practically always deliver the goods to the person holding the bill of lading, if they have not been stopped en route.

I shall say something about stopping them en route in the next article.

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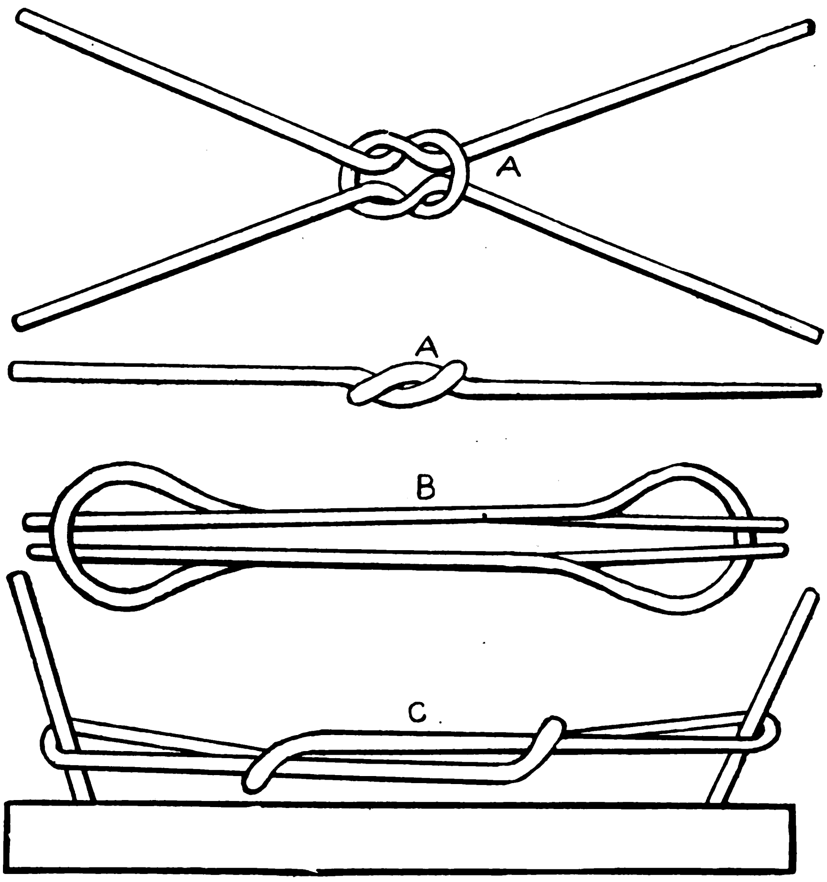


HOW TO MAKE THE KNOT USED IN ORNAMENTAL IRON WORK

Several Live Topics From An Australian Point of View

G. J. Iler

Very rarely do I ever criticize anything, especially in regard to newspaper arguments, without first having made investigations in order to gain the necessary knowledge through practical experience, entitling one to speak first hand, without which one has no right to express an opinion. With some of us the knowledge we have gained on cold tire setting amounts to very little, indeed; we do not know nearly as much as we think we do. In proof of which one has only to read some of the statements sent in as to the amount of work done in a given time by some of our "lightning sketch artists."

Quality

My experience, extending over a period of thirty years at the trade, has taught me that where quality is the first consideration one has to take reasonable time. One of the reasons why I quit shoeing horses was because a capable man is unable to compete with some of these fast shoers; as the majority of customers favor quantity rather than quality. Were it otherwise, I am inclined to believe that a very great number of horseshoers—so-called—would be looking for jobs outside the trade. Until something is done in the direction of weeding out the incompetents, and for the uplifting of the trade generally to the position which it ought to occupy, I am afraid that it will go from bad to worse. What do we find today! I very much regret to have to state that the opposite is the case. I maintain that the smith should be the most independent and his the most dignified of all trades, because every trade and calling depends directly or indirectly upon the much despised smith. Take away the smith, and the industrial and commercial activities of the world would cease instantly.

Wages

I now confine my energies to machine and general smithing, which I find more congenial and profitable. My shop is located in the suburbs of the city. At present I employ two hands besides myself. I could use more, but first class hands are

hard to get; owing to the unprecedented prosperity ruling. Trade unionism is very strong. A few months ago the farriers went to the Arbitration Court and were awarded a further advance in wages—to 3£ ($14.60) for floormen, and 3£-6-0 ($16.06) for firemen, for 48 hours per week. The employers, in consequence, met and decided to raise the prices to six shillings ($1.46) for light, plain shoes, and seven shillings ($1.70) for draught; resets and old shoes half price. Previously they were charging one shilling ($.24) less. In the building line, bricklayers, carpenters, etc., receive fifteen shillings ($3.65) per day of 8 hours, and all other trades in proportion.

Cold Setting

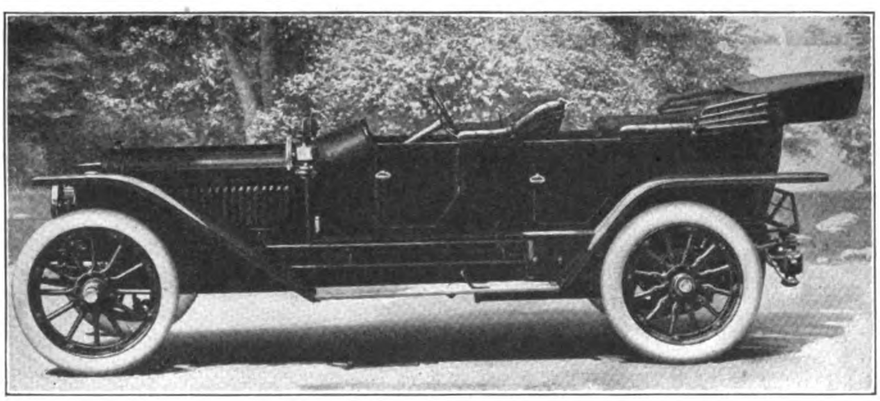
I purchased an edge-grip cold tire setter through an advertisement in THE AMERICAN BLACKSMITH, the first of its particular make ever introduced into Australia, and I am pleased to state that I have never once regretted my choice. In fact, so satisfied am I with it that, could I not procure another, I would not take for the one I have three times its cost price. And after three years' trial I am thoroughly convinced that all kinds of tires up to ¾ inch thick can be set quicker and better by this method than by the old hot process, notwithstanding that so many are writing against it. What applies to other machines also applies to cold setters; and that is, one must use brains and common sense. I do not claim that it will make an old wheel as good as new, or tighten properly one that is all loose in the rim, etc., without first removing bolts and wedging spokes, as would be necessary if one were doing it the old hot way. The above is written in defense of a method of doing work which has to me proved both profitable, expeditious and in every way satisfactory; so much so that I feel that if I were compelled to again adopt the old method I would hesitate a while before taking it on. What I once looked upon as an irksome job I now delight in.

Lozier Cars For 1913

The cars illustrated are of the Lozier 1913 models. The three principal improvements noted on these cars are, the left-hand drive, the automatic-level oiling system and the triple ignition arrangement.

There are a number of good reasons for the left-hand driving arrangement, and not the least among them is the possibility of maintaining the symmetry and clean design of the car body. Then, too, the left-hand drive allows for quicker and easier control in crowded streets; to say nothing of the convenience when the passenger who rides with the driver of the car enters or alights.

The automatic-level oiling system consists of tilting troughs securely mounted in the lower part of the crank-case. These troughs are so constructed as to receive a copious supply of oil from the pump. The troughs are connected with the accelerator pedal so that when the throttle is opened the oil level is raised to supply the necessary lubrication. This arrangement also automatically reduces the oil used at slow speeds.



A LOZIER 1913 MODEL. THE LEFT-HAND DRIVE FEATURE IS HERE SHOWN

Triple ignition is an improvement that can be traced directly to road and speedway racing. On the 1913 model Loziers a Bosch double magneto and two sets of spark plugs are used. And these with the battery form three distinct sources of ignition.

The Way to Figure Profits

E. ST. ELMO LEWIS

Recently a business efficiency expert caused to be inserted in several national mediums a little problem he had found that always agitated the minds of retail dealers wherever it was propounded. The problem was stated as follows:

Wholesale price of an article is....	$1.00
Cost of doing business..........	22%
Retailer's profit................	10%

What is the retail selling price?

Remember, you are basing your percentages on selling price.

Some correspondents in their desire to contribute to the humorous rather than to the serious columns of the publications have expended a prodigious amount of clumsy wit in making fun of the man who would compute profits with percentages figured on his selling price. They seem to think the "good old arithmetic" is the sole arbiter of the question.

I believe the writer has as much respect for the "good old arithmetic" as he has for the good old anything else, but he believes also that the world moves; that you can't stand pat on the methods of statement indulged in by the old arithmetics, any more than you can stand pat on anything else in the world.

Scientifically, two and two always make four. Practically, two horses and two cows are neither four horses or four cows, but four animals.

So you must always be careful in the statement of your facts; because one statement does not always equal another.

From an article printed nearly a year ago I get an illustration of the principle involved in the statement of the foregoing problem of figuring profits on the price.

"You will find in every arithmetic such examples which are scientifically true, but which do not allow for the false thinking of a great many very practical men. A man buys a horse for $50.00 and sells him for $75.00. What percentage of profit does he make? Answer, 50%.

"The arithmetic figures the percentage of profit on the $50.00, and not on the sale.

"The consequence is that our good teachers have led us to think of the

percentage of profit from a standpoint that makes many men *think* they are making much larger profits on the business they are handling than they really are. This makes them prodigal of expense and very often leads to a failure, which with a more thorough knowledge of expense from a practical, every-day standpoint could have been avoided.

"Suppose a man has in contemplation a horse for sale on the basis of the above transaction. A horse broker approaches him and offers to conduct negotiations. He asks a commission of 33⅓%. Now, the owner of the horse, believing he can get $75.00 for him, and having a profit of 50% in sight, agrees, and the broker having completed the transaction, renders a bill as follows:

Sold one horse at..............	$75.00
Commission 33⅓%............	25.00
Due seller.................	$50.00

"In other words, the seller's books show a profit of 50% entirely eaten up by a commission of 33⅓%. This problem is thoroughly descriptive of the difficulties of a great many of our smaller merchants."

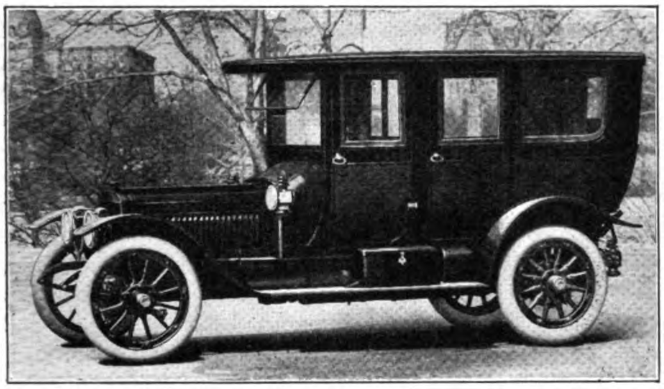
Let us for the sake of argument, and for the purpose of clarifying the situation that has been somewhat fogged by men who think from entirely opposite poles, beclouding the issue with the dust of ridicule instead of trying to clarify it by sound reasoning, suppose a man starts in a small business and, in order to keep the problem in harmony with the one stated in the first paragraphs of this article, I shall assume a large expenditure for expenses, etc.

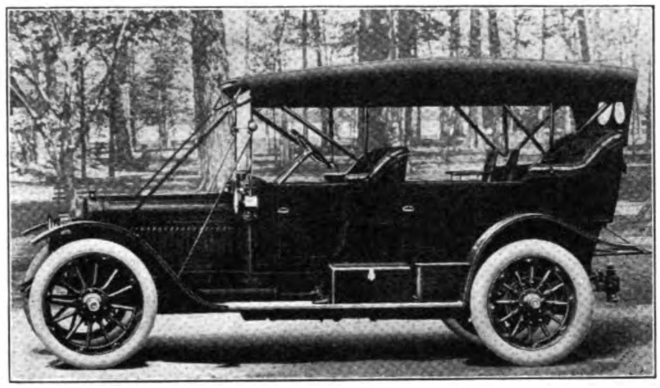
The amount of percentage, of course, has absolutely nothing to do with the principles involved in the computation.

Suppose our man buys his stock of goods and, as is usual in such cases he prices them at what the wholesaler's salesman tells him he ought to get for them.

At the end of the month he finds that he has done a business of a thousand dollars.

He has kept a close track of all the sales and finds the goods he has sold, at invoice cost, cost him $680.


THE LOZIER 1913 LIMOUSINE—"KNICKERBOCKER"


THE TOURING MODEL FOR 1913—"RIVERSIDE"

He finds that his total selling expenses, etc., are $220.00, and thus he has $100.00 as a *profit.*

He does a little figuring.

He assumes that his cost of doing business is 22% of the total amount of business that he has done—that being the easiest way to figure it. He has made a profit of 10% of the total amount of business. This is quite the natural way for the average man to figure it. Let us suppose, therefore, that he proceeds to replenish his stock with exactly the same kind of merchandise that he had before, and he thus buys another $680.00 worth of goods (we assume this simply for the sake of illustration). He gets the goods in and he says: "I'll mark these to make 32% over cost, because I want to make 10% profit, and 22% will cover the cost of doing business, etc."

What does he get? He finds at the end of the month that he has sold the same amount of merchandise, but he has received only $897.60 for it. In other words, he hasn't made his $100.00 profit, but has actually paid out $2.40 more than he received.

Had the man's knowledge of percentage been more thorough, he would have realized that, while the $320 was 32% of his sales of $1,000, it would be necessary to add 47% to the cost of his merchandise to get selling prices to total the desired $1,000.

Briefly, could it be argued with success that because $320 was 32% of $1,000, it, therefore, was 32% of $680? But it is just there that our man fell down!

He has been guilty of two fallacies in his methods. In the first place he has based the percentage of profit and cost of doing business on his *volume of business*, but applied these percentages to his *cost* price when it came to making new prices. And in the second place he is not trying to make any money on the amount of capital paid out for rent, help, advertising, etc. It is just as real capital that pays the help as is the capital which it takes to pay the wholesaler for the merchandise, and a man should make money on both, because both are part of the service which his capital procures for the purchasing public.

How should he have protected himself in the matter?

Let us figure it out a moment.

Our dealer has found that his cost of doing business is 22%. He wants a profit of 10%. We assume that 100% is what he gets for the article. Therefore, we deduct the 32% from the 100% to find out what per cent of the total price the cost price is; because the cost price will be that portion of the 100% which is left after deducting the percentage required to pay the cost of doing business and the profit. We find, therefore, 68% of any selling price, where the cost of doing business is 22% and the profit desired 10%, represents what any article costs. Suppose the article cost $1.00. We divide $1.00 by 68 and after adding two ciphers get $1.47 plus as a result. Let's prove it. If a man sells the article for $1.47, and is allowing 22% for cost of doing business, he gets 32 cents plus for expenses. If he has figured on 10% of his business as profit, he finds that he gets 14.7

cents, or 15 cents profit. Deduct your 32 cents cost of doing business from your $1.47 and you have $1.15. Deduct 15 cents profit and you have the $1.00 left.

So we have proven that it works. And we propose to prove that this is the better way to handle the figuring of profit, for a good many reasons.

Suppose a man wants to do it the "good old arithmetic way." What does he have to do?

He has found out that 22% of the total amount of business that he has done represents the cost of doing business. He figures that, if he makes 10% on the amount of business he is doing, he would be making a fair return on the amount of his capital invested. He understands that he is getting his percentages on the amount of his business, but he wants to figure his profits on his cost price.

All right. We find by referring to the "percentages of profit tables" that, in order to make 32% *of the selling price* to cover cost of doing business and to make a profit, *he will have to add 47% to his cost price.* (You see our $1.47 comes in on an article that costs $1.00.) In short, it doesn't make any difference whether you figure on cost or selling price as a basis, *provided* you understand that 10% profit of your gross business will not produce the profit when you use it as a profit to add to any given cost price.

A very simple illustration will suffice. Suppose your selling price on an article is $1.00. You know it costs you, altogether, 90 cents to get it into the hands of the customer. You say that's 10% profit. But suppose another bill of goods comes in and you say, "I'll mark it up 10%." You mark it up 10%, and it gives you 99 cents, doesn't it? It doesn't give you $1.00, does it?

But if you kept in front of you the fact that 10% of your selling price meant 11.11% of your cost price, then when that bill of goods came in you would mark it up 11.11% of the cost price, and the price would be 99.99 cents, which you would make $1.00.

After all, therefore, it comes down to the question of the policy of figuring profits in selling or cost price. We know—what I believe all our readers will admit—that we can get very sadly tangled up sometimes. I know from a pretty wide investigation that many a man is today figuring in the dark, with a result that is unfortunate, because he does not keep the percentages of profit from his cost prices.

We know that it makes a very great deal of difference how you look at a thing. It is important that the average man should consider every part of his business carefully.

This is the day of scientific management. This is the day when we are trying to consider things from a practical standpoint. The advantages of figuring your percentage of profit on the selling price and not on the cost are obvious, if we will consider them open mindedly and dispassionately, and leave the good old arithmetic—for it is a "good old one"—and, while being profoundly reverent of the ancient problems, yet know how they work in our every-day lives.

Thus, because a problem is *stated* in one way doesn't mean that it can't be *stated* in another, and the last be a better way of stating it. The following reasons for handling profits on a basis of selling price are paraphrased from Thomas A. Fernley's book, "The Right Way To Figure Profits."

1—The remuneration of salesmen, for instance, is figured on a percentage of the selling price and is not figured on the cost price. Therefore, the selling price plan works in harmony with that.

2.—The percentage of expense of doing business is based on the selling price.

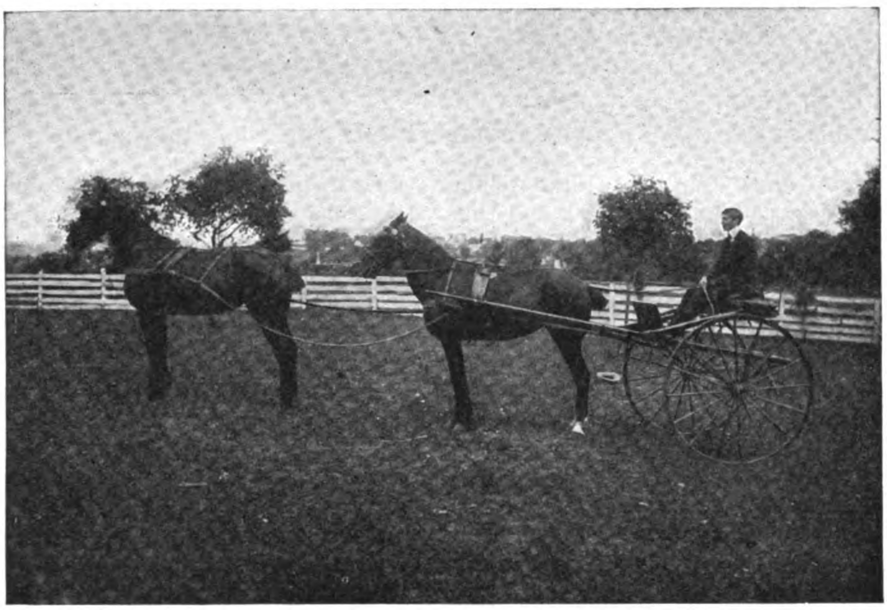
If you talk and think of your percentage of profit on cost and your percentage of expense on selling price, nine cases out of ten you will lose money before you get yourself untangled.

3—Because the mercantile and other taxes are invariably based on the percentage of gross sales. Therefore, it is important, if you are figuring in your mercantile and other taxes in your expenses, to figure them in the same way in which you are figuring your anticipated profits and making your selling prices.

4—Because the sales totals are always given in books of records. Cost totals are seldom if ever shown.

5—Because a profit must be provided for two items of capital. On the capital invested in merchandise and on the capital necessary for operating expenses and other expenses not properly chargeable to merchandise account. This is possible only by figuring a profit on the selling price.

6—Because it indicates correctly the amount of gross or net profit when the amount of sales is stated. If you are figuring your percentage of profits through the selling price, a statement of gross sales for the day or month or year would be a pretty accurate indication of what you should expect in the way of profit. The percentage of profit on sales is indicative of result of a year's business—percentage of profit on cost is not.



A PRIZE WINNING PAIR FROM VIRGINIA

7—Because allowances in percentage to customers for cash discounts and otherwise are always from the selling price. Therefore, you can figure more accurately in taking your cash discounts into consideration if all your percentages are based in the same way.

8—Because no profit is made until the sale is actually effected.

9—Because by harmonizing your entire plan of figuring your percentages relative to profits in business, etc., with the entire plan on which your merchandising is harmoniously developing, you will not consider your selling price, percentage of profit and expense, etc., entirely different from anything else.

In closing I would like to call attention to a little thing that was written by one of the great merchants of this country—a man, who, by the way, has probably been brought in contact with as many different retailers as any other man in business—Mr. W. D. Simmons of the great Simmons Hardware Company of St. Louis. Mr. Simmons recently wrote an article for the *Hardware Reporter*. In this article he called attention to the one great difficulty with the retail business—that retailers' accounting did not *account;* that in some of the fundamental methods of figuring they were incorrect; that in too many cases their books of account did not show their expenses or their gross profits for comparative purposes, and if the testimony of the great firms of public accountants was concentrated in one expression, *it would be to the effect that more business goes wrong by poor accounting methods than by poor salesmanship or buying methods.* For this reason this little problem is an important one and should not be entangled with personalities or the cheap blackguardism of those who would rather be witty than right.

Manganese Steel in Switches, Frogs and Crossings

THOS. F. KEANE
Ramapo Ironworks

The use of manganese steel in switch, frog and crossing work has in the past few years become so extensive that it has become a subject of great interest to railroad men. Cast manganese steel was the first in the field; and improved methods of pattern-making, molding and heat-treating now produce such sound castings and tough metal that the cast product, at least at present, bids fair to hold its own against the newer rolled or forged manganese steel.

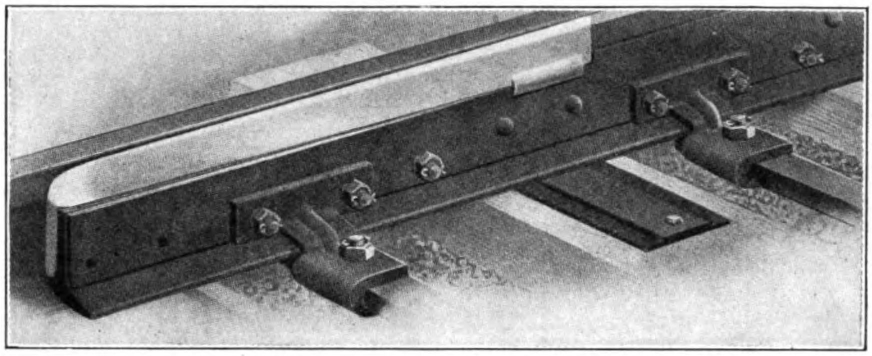


FIG. 1—SHOWING A MANGANESE PROTECTED RAIL POINT

Each angle of crossing or frog presents its own problem in design. Our aim has always been to produce material which will prove the most economical in the long run. To accomplish this end we have to bring the quality of the design and workmanship up to the level of the material used. A common fault of manganese center frogs is that the heel rails work loose. As soon as this happens, the rails, bolts and casting are subjected to greater stresses than they should take and, if nothing breaks, at least the wear due to pounding and working up and down is much greater than would otherwise occur. To prevent failure from this cause we have so designed our frogs that not only are the heel rails well protected by the castings, but they are secured by four bolts and two rivets. This may seem a simple remedy, but it has proved effective. We also use a large number of bolts of generous diameter through the body of the frog, to make sure that the wing rails remain in place during the life of the casting. For the heavier rail sections we use nothing smaller than 1¼-inch bolts; and in some cases 1⅜-inch.

The same general principles of design have been followed in the manufacture of manganese center crossings. The larger angle crossings are provided with manganese center wearing surfaces throughout; and the smaller angles are protected at the intersections only, so that the expense is not increased out of proportion to the increased life. One of the places where many different designs of manganese steel wearing surfaces have been used is at the point of the split switch.

It is well known that the first thirty inches of point, particularly a curved point, are subjected to the severest wear. By protecting these thirty inches so that the life will be equal to that of the rail at the heel of the switch we obtain switch with a life equal to that of the adjacent running rail. If we increase the life beyond this point we do so to

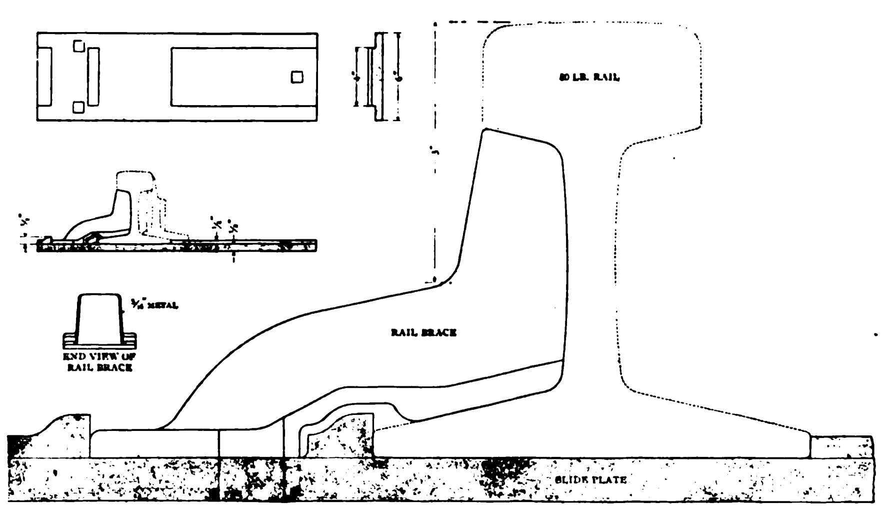
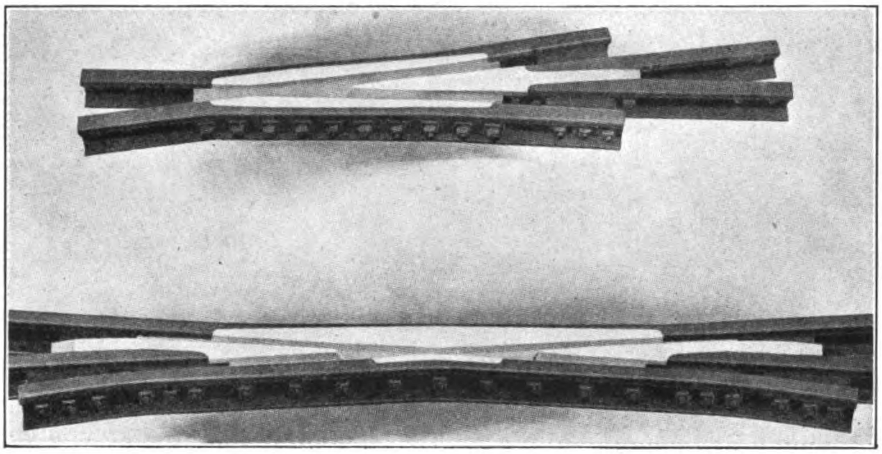


FIG. 2—SHOWING SOLID ROLLED SWITCH PLATE AND DETAILS



MANGANESE HARD CENTER FROGS—SHOWING METHOD OF FITTING TO REGULAR RAILS

no purpose, since when new rail is laid new switches should also be put in. Consequently, it is poor economy to make the manganese point any longer than enough to guard against side wear.

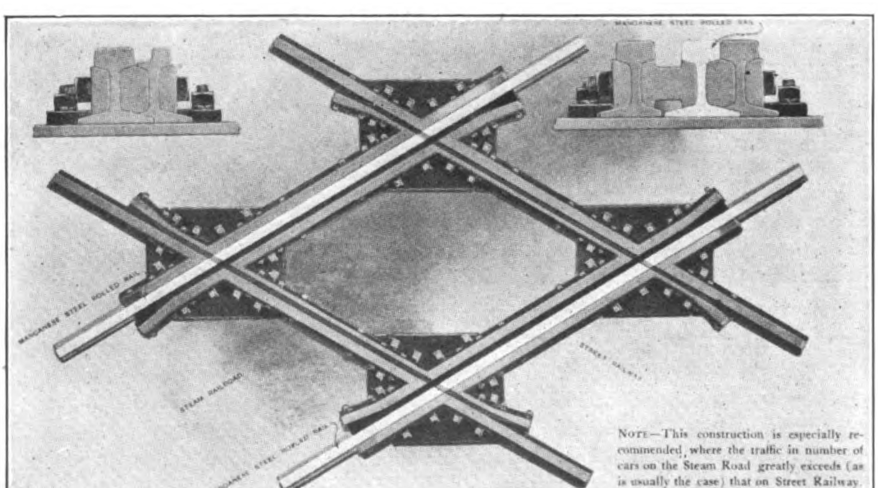
The accompanying engraving, Fig. 1, shows the method of attaching this manganese wearing edge to a point. The web and base of the rail are continuous, and only the head is cut off. The manganese steel casting which forms the running and wearing surface rests on top of the web where the head has been cut off; a foot rests on the base of the rail between the point rail and the switch rail. The casting is firmly held to the point rail by bolts and rivets through the web and is further secured by a lug fitting over the top of web. A projection at the end of the casting toward the heel of the switch fits between the base and head of the rail, providing space for additional fastenings. This precaution will prevent a derailment in case the rail breaks at the point where the full section joins the part where the head has been removed.

Manganese wearing points on switches do not begin to give the increased life possible if the switches are supported by such flimsy fixtures as pressed steel risers and pressed braces. A square shoulder is required; and our dies must be set to give as small a fillet as possible. Consequently when the riser is pressed up the plate is almost cut in two at the very place where the load is greatest. As a consequence the riser flattens down, the plate buckles and in a short time breaks. The riveted riser which has to a large extent displaced the pressed riser is a step in the right direction, but the small countersunk heads necessary soon work loose and give trouble.

We have perfected a solid rolled slide, 6 inches wide with a 4-inch riser, and with ½-inch shoulders outside of the stock rail and outside of the rail brace. A study of Fig. 2 will show that the design of this plate has been carefully worked out in its smallest details. Note that the spike holes are placed back from the flange of the rail, so that the spike is not loosened by having the flange constantly working against its shank. The ½-inch shoulders hold the track absolutely to gauge, leaving the spikes to hold the plates in position. These plates also allow a uniform rise for the full length of the switch, so that a uniform bearing can be had under the points. This equipment gives the manganese steel wearing surface ample support throughout its life and cuts down the cost of maintenance to a minimum, by reducing the effects of ordinary wear and tear.

The solid cast reinforced manganese steel frog has become deservedly popular in a comparatively short time. This frog is made just long enough so that rails of full section can be spliced on at the heel and toe. Heavy reinforcing straps rolled to fit the rail section and forged to shape are fitted to the frog throughout its entire length, and act as splice bars at the ends. Fishing extensions at each end of the casting, together with the abovementioned straps, form a rigid joint. Full length rails may be attached at both ends. Thus, we have practically a manganese center frog of a length equivalent to the length of the lead rails and the full length rails which are attached to the heel. Hence we have good economy; since it is only the center or intersection which is subjected to heavy wear, and this center is short enough to be relatively inexpensive when the life of the frog is considered.

There is an erroneous opinion among many railroad men that the point of a frog is the first to wear out. It is clear that, if a frog be properly built, the wing rail will always support the tread of the wheel until the wheel has advanced on the point at least to where its width is equal to the width of a rail head. Beyond that place the point rails should be subjected to no greater wear than a straight running rail. With this in view we have made the wing rails of rolled manganese steel. This tough metal does not wear down rapidly, and the point will not go down any faster

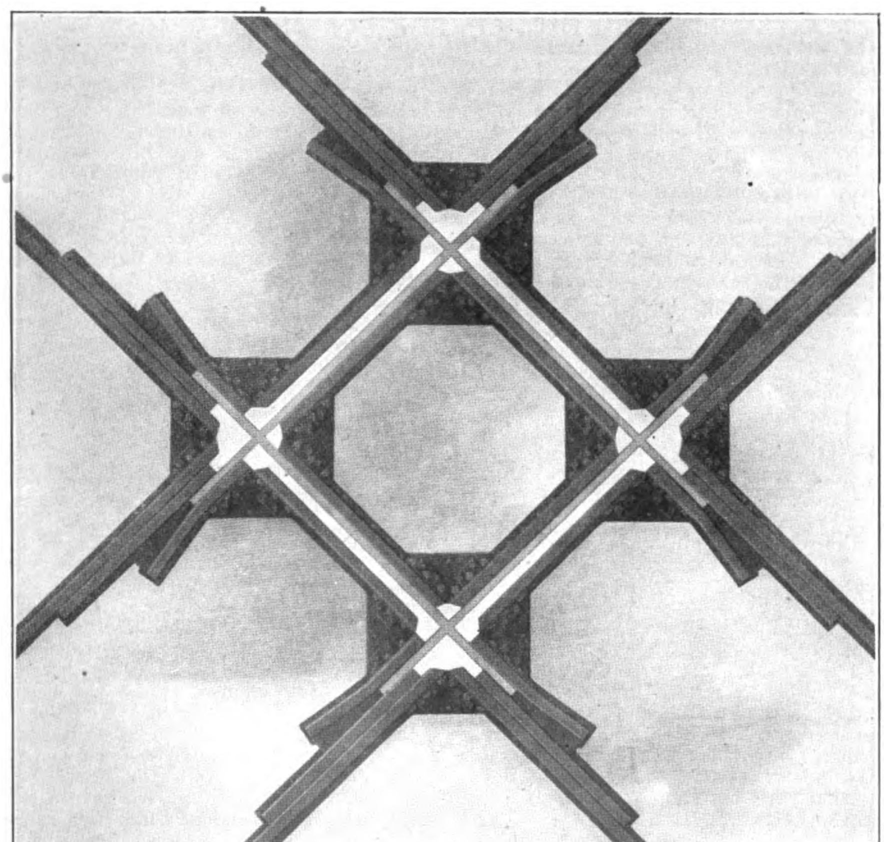


THE MANGANESE CROSSING FOR A STEAM ROAD AND STREET RAILWAY COMBINATION

than the wings. This design of frog is the cheapest of all manganese frogs and its life will compare favorably with the life of the other designs. Where frogs are used in connection with rolled manganese steel running rails we make the heel rails also of manganese steel and furnish a cast manganese steel point. In this case the plate may be omitted, since the cast point has feet resting on the flanges of the wing rails and is so designed as to hold the heel rails securely in place.

We have also used the rolled manganese steel in crossings. It is of particular value in crossings having heavy traffic in one direction only. In such a case the rolled manganese steel rail may be used as a running rail in one direction with great efficiency and reasonable economy. Solid cast manganese steel crossings are being extensively used on many lines. Many of the earlier ones opened slight cracks in the flangeway after very little service. This was due to a spongy condition of the metal at this point, but was not serious, as the cracks in most cases did no more than open a trifle, and actual failure occurred only in an extremely small percentage of cases. The more experienced manufacturers now overcome this checking by proper webbing and careful design of patterns. We are furnishing solid cast manganese steel crossings with the corners reinforced with wrought iron or steel straps similar to those used on the solid frog, and with outside arms of open hearth steel rail attached.

The whole question of the use of manganese steel comes down to a question of economy. Each particular location is a special problem. The angle of the intersection, the tonnage passing over it and the character of the foundation are important factors in determining whether manganese steel construction will be economical and what design of manganese steel construction will be most economical.

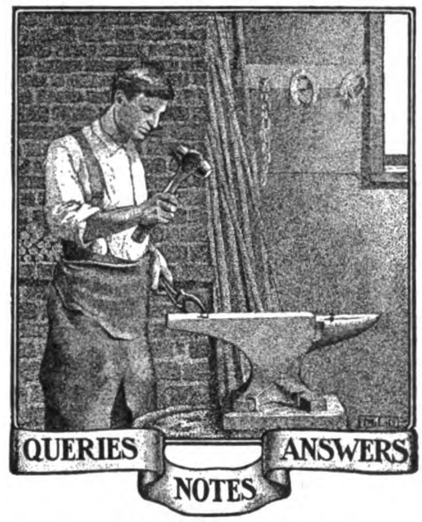


A MANGANESE CROSSING—THREE RAIL BOLTED PLATE TYPE WITH EXTENDED EASERS

Opportunities

Here are listed a number of live opportunities for live blacksmiths—towns and localities where blacksmiths are needed. If you want to start anew and if you have the necessary energy, skill and perseverance to stick to business until business sticks to you, get into touch with these business chances. Write to the man or firm named under each address.

COLORADO—at Cowan,
Address B. Prince & Co.
COLORADO—at Carlton,
Address L. H. Frybarger.
CALIFORNIA—at Grizzly Flats,
Address L. J. Lyon.
CALIFORNIA—at Haiwee,
Address James Cowan.
CALIFORNIA—at Sheridan,
Address Postmaster.
CALIFORNIA—at Wahtoke,
Address C. B. Kern.
CALIFORNIA—at Sattley,
Address G. M. Surgurd.
COLORADO—at Hahns Peak,
Address H. Crinwell.



To Melt Copper Scrap.—I would like to know the best and simplest method of melting old scraps of copper so as to make bars or moulds for making soldering irons.
W. E. RAYNER, Australia.

A Sawmill Question.—I wish to know if there is any method by which I can make a set of boss dogs on a sawmill carriage work well. If so, will someone kindly explain how?
DONALD C. FORSYTH, Ontario.

Contracted Feet.—Will some brother horseshoer tell me how to shoe a horse, the inside of whose front feet is contracted, so as to make them grow to their proper shape again and keep them from interfering. My method has been to weld a side calk on the heel nearest the other foot. C. D. HUSS, Pennsylvania.

From a South African Friend.—I served my apprenticeship in Aberdeenshire, Scotland; having worked at the trade for the past thirty-six years. I have been in my present shop in South Africa for over eight years, doing principally wagon-making and general blacksmith work. In addition, I have worked at engineering and ship work. I gave up horseshoeing over twenty years ago.

I like THE AMERICAN BLACKSMITH very well, and find the talks of much interest. Every smith should be able to learn something from "Our Journal" every week. The paper is worth the support of the trade, and in fact it is a marvel that it can be produced at the present cost.
WM. W. WATT, South Africa.

A Note From South Africa.—THE AMERICAN BLACKSMITH is a paper that is always worth reading and contains a good deal of information for all blacksmiths. My work is principally ornamental railing and gate work, but I do a good bit of agricultural implement work. We are in the Albany

district, which is a very good farming center. I have one assistant and two helpers. I am very much pleased with the information which you give on motor work, as I do considerable of this class of work.

J. H. HOYLE, South Africa.

Wants More about Engineering Work,—I would like to see articles on electric welding and engineering smith work for beginners. Also further information on the process of oxy-acetylene welding. Some time ago I had given to me a powerful acetylene lamp, and by a little experiment I attached a blow pipe to the gas chamber and was able to use it as a brazing lamp. Now I have been studying the articles written by other men in the journal and am quite interested in this work, but cannot understand the different pressures, especially as regards the oxygen.

J. N., England.

From a Beginner (?).—I must say that I am thoroughly satisfied with "Our Paper," and have found several of the "wrinkles" contained therein worth knowing; especially in regard to horseshoeing. I have plenty to learn; being, you might say, only a starter at the "game" (eight years). I have had varied experience with portable engines, steam pumps, horseshoeing and general blacksmithing,—all country work. Many a time I have had people in the country come to me to have a horse's shoes removed, solely because the frog was touching the ground.

WM. MILLER, Australia.

Second Growth Timber.—Kindly enlighten me by explaining in your journal what is meant by second growth timber.

W. O'GORMAN, Missouri.

In Reply.—The term "second growth" originally meant that timber grown upon ground that had previously grown timber of like character. In the trade, however, it is used to designate a grade of timber, but it is now so loosely used that except when considered in connection with other terms of grading it is difficult to tell exactly what "second growth" grade is Often stock that is "forest growth" of good quality is classed as "second growth."

A. J. L., New York.

Shoeing Business Good in New South Wales.—I have a brick shop about 25 x 40 feet. I only do horseshoeing, but have plenty of work, having employment for four in the shop continuously. We average ninety sets of shoes a week, constituting forty-eight hours. The prices which are controlled by the Master Farriers' Association are six shillings ($1.46) a set for light horses and seven shillings ($1.70) a set for heavy horses. The wages are three pounds ($14.61) a week for a floorman and three pounds, six shillings ($15.07) a week for a fireman. Horseshoeing is very brisk here at present, all the shops being very busy.

J. WILSON, Australia.

Two Useful Vehicle Kinks.—In reply to Brother Gillman, will say that the best way to remove a wagon spoke tenon is to take a ½-inch lag screw, weld stock 2½ or 3 feet long on it, then weld a cross bar on for a handle. Now bore ⅜-inch hole in stub, put a short piece of gas pipe on the rod and screw it in the stub. Now a few good blows on the pipe will bring the stub out.

I will also endeavor to tell how I made my heading tool: Take a piece of stock, 7/16 x 2½ or 3 inches, drill holes from ¼ inch up as large as you want. Now turn over and countersink each one. This makes a very good heading tool and is also good for different size dowel pins.

H. BARRETT, Missouri.

From the Land o' the Thistle.—My work consists principally of horseshoeing, plow repairs, fence work, lawn mowers, motor repairing, springs, break plates, etc., and the making of field implements in seasons when I am not busy. I have been at the trade thirty-two years, am running two shops at present with two helpers and have been fairly successful. Work in Scotland is not so plentiful at the present time, for the new improved plows and other implements repaired by duplicate parts are doing the work, and machine made bolts and other ready made forgings lessen the work. I have just purchased a new Peter Wright anvil which is very satisfactory. The joiners are by themselves here, so that I do no woodwork. A good price for work in this country is ten pence ($.20) an hour.

CHARLES J. MATHER, Scotland,

In an Australian Log Camp.—I served a thoroughly strict apprenticeship under my father in the City of Glasgow, Scotland, as a farrier and general smith. He had a general smithing and engineering shop there and did a lot of work among motor cars, gas and oil and steam engines of all kinds. There I learned all the different styles of horseshoeing; especially the shoeing of diseased feet. Ninety-five percent of the horses had a blemish of some sort; almost every horse was strained in the legs, had sidebones or else ringbones.

I am now located in a log-hauling camp in Western Australia, many miles away from any town. Here I have ninety horses to shoe, all the trace chains and the gear in connection with log-hauling to keep in repair, etc. My helper and I are kept very busy.

GEORGE MCGILLIVRAY, Australia.

An Australian Implement Works.—I am at present employed by a firm of agricultural engineers. The main shop is 200 feet x 50 feet, with saw-tooth roof, under which are situated the moulders, smiths, carpenters, fitters, turners and tinsmiths. Another building contains the paint shop and timber shed. Power is derived from a 40 H. P. gas-producer engine. There are four forges in the shop and between 30 to 40 employees. The principal article of manufacture is chaff cutters. I have previously worked in shoeing and general smithing shops. Until entering this present shop I had never worked with a blast, and I would not now care to go back to the old-fashioned bellows.

I have been a subscriber to "Our Journal" for several years and always look forward to the arrival of it; as I find it very interesting and instructive reading.

A. E. KAUFFMANN, South Australia.

Engine Cooling and Lathe Work.—I have made a pump for my gasoline engine as described in the February number, 1911, but I cannot say it is a success, as it does not circulate the water fast enough. Can you get Mr. George J. Murdoch to suggest such changes as he deems necessary from the attached? I am inclined to believe that my compression chamber is too large for a six horsepower engine, and I would like to secure the advice of some competent authority. The water is lifted from a barrel sunk in the ground, and from the water level to the overflow pipe is 3½ feet. The pump will not throw a stream any larger than a common lead pencil, which is not fast enough for long runs.

I would also like to hear from some of the brother craftsmen who have installed lathes in their shops and who have had no previous experience in handling lathes. Would I be justified in considering the proposition? I intend opening a garage in connection with my shop, and am undecided on the lathe question.

Z. A. ENOS, Kansas.

A Letter from New Zealand.—I have been at the horseshoeing and coachsmithing trade the last twenty-three years, eleven years for myself, and I am doing well. The AMERICAN BLACKSMITH is a very good paper for a man that gets down in a rut and wants to be pulled out and improve his business. I am always willing to learn, for if we lived three hundred years we could still learn more. There is one thing that I would suggest in your paper. The majority of your subscribers have small shops, and they want information on small jobs and the quickest and simplest way to do them. There is another thing,—horses are shod different in every country. I have saved all my copies of THE AMERICAN BLACKSMITH and I am going to bind them.

Regarding cold tire setting. The people in this country don't favor it. The common run of tires we put on here are 1⅛ inch x ½ inch to 5 inches x 1 inch. I would also like to say that Helder Bros.' tools are O. K. VINCENT POOCH, New Zealand.

From An Australian Shoer.—I am living in a suburb of Melbourne, which you know is the capital of Victoria. I came from South Australia and have been here only seven months. Two of us are going to start partnership in another suburb called Clayton, and I think that we will succeed. We have one customer who says he can't secure satisfaction anywhere around and is going to give us a try. He owns about twenty to thirty of the best horses and trotters in the district. They say he is a very hard man to please, but I think I can fix him up all right. I am the shoer, and have found many useful hints in your paper. I would like to see a little in the paper on shoeing the trotter and the racer and plate shoeing, as I am not very far advanced in plate shoeing. I would like you to send me a recipe for a good corn remedy. I can cure a corn by shoeing, but some people think if you don't put anything on the corn, you don't know anything.

W. L. WHITEBREAD, Australia.

Kentucky Prices and Cheap Work.—I thank Brother H. O. Rippen very much for his information on Kentucky blacksmith prices. Now I don't know what part of Kentucky he is in, but he must be in a bad part as well as myself. His prices run about the same as mine.

I would like to ask brother blacksmiths in Kentucky or in any other section of the country as to what ought to be done with a man that buys thirty cents' worth of tools, goes to the store and pays fifty cents for shoes, twenty five cents' for nails and a basket of coal and puts out a sign over his shop, "Horseshoeing, $ .45." Now I don't claim to buy goods by carload lots, but I have over thirty cents worth of tools and aim to have as much as a half keg of shoes at a time. Now that man that said that he had a sign over his door—"Not Responsible For Your Horse If He Gets Hurt", you tell him to paint out that sign and replace it with one reading—"Who's Responsible For the Blacksmith If He Gets Killed?"

ARTHUR SPALDING, Kentucky.

A Letter From South Australia.—I have been a subscriber for about five years, and look forward keenly to receiving it every month. I only regret there is not a quicker transit between our two countries. The Questions and Answers Department is a splendid addition.

I have also followed closely the opinions on hot and cold tire setting. We have only the old style in our location—the hot process. I think the tires should be done cold, but up to date it is not up to the standard that it should be or will be. We have a lot of tire setting to do here; the tires ranging from 1⅛ x ¼ to 7 x 1¼. There are very few machines on the market that will set these tires successfully.

We do all kinds of general work—shoeing,

tiring, painting, and in a small way make implements such as plows, harrows, wagons and sulkies.

We have had trouble with beveled tires, sometimes caused in putting them on (new tires). What is the best way to take the bevel out?

We have an organization which we find a help to one another.

J. L. REHN, South Australia.

Fullering Shoes, and Apprentices.—Will you tell me the advantages of fullering a shoe, beyond creating an uneven surface to prevent slipping and giving the smith the advantage of using smaller nails. Mr. Weaver says to fuller the toe makes it lighter. I have fullered a toe and fullered all 'round, but when I weighed the shoe it was just as when plain bent, except for scale waste.

Would it not be possible to create an apprentice page, on the first management of the fire, hints on small forgings, etc.

T. R. GRETTON, England.

In Reply.—The only advantage of fullering, as you say, is to give the animal a better foothold. Fullering, as generally understood, will not lighten the weight of the shoe. However, if the metal is removed instead of simply forced aside, then the shoe will be lighter, of course. This is probably what Mr. Weaver meant.

With reference to articles on the care of the fire and the like—several series have already appeared in our columns; especially written for the beginner. It will be some months before another series is published.

THE EDITOR

A Modern Power Shop of Queensland.—I am subscribing for three American trade journals at the present time and, if I were compelled to reduce the number, yours would not be the first or second to be cut out. I appreciate your efforts to raise the dignity of the trade and the standard of the work. I have been in business in this town for three years. I am a believer in power and a little over a year ago sold my oil engine and installed a 20 H. P. Crossley Suction plant, and find such machines as the band saw, surfacer, circular saw, power drill, emery machine, power hack saw, blower and lathe indispensable. Trade at present is quiet, owing to the long drought that we have experienced, this being almost solely an agricultural and dairying district, and the general strike of forty-three trade unions in Brisbane will not improve matters. My business has been the better for the good advice given in your journal concerning business systems and methods. I think there are more failures from bad or improper methods of costing and time keeping than any other. The office end of the business if rightly looked after will soon put one on the right track.

I am very much interested in oxy-acetylene welding, and any practical articles on the subject would be well received.

ROBERT LANG, Australia.

A Handy Calk Wrench.—I have made a handy wrench for Neverslip calks, as follows: I took a flat piece of steel, 10 inches long, ¾ inches wide and ½ inch thick, and bent one end as shown. Then I split the handle so that it goes over the other part and drilled a hole in both of them for a bolt.

C. D. HUSS, Pennsylvania.

An Opinion From South Australia.—I have been a reader of THE AMERICAN BLACKSMITH for many years and would not be without it for any price. I have learned a tremendous lot of good things from it. I worked at blacksmithing and horseshoeing for sixteen years, but on account of my health I sold out my blacksmith business three years ago, and am at present doing finer work; such as gun making and repairing, bicycle building, watch and clock repairing, brazing, electroplating, etc. Of late I have also been doing casehardening of gun frames and other small fittings, with very good results. This work I have learned entirely from THE AMERICAN BLACKSMITH, in addition to many other kinks, as also repairs on oil, gasoline and petrol engines. THE AMERICAN BLACKSMITH is a splendid craft paper—my best friend and helper.

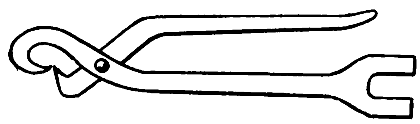
My equipment consists of a small sized Buffalo portable forge, an emery grinder, three drilling machines and numerous other appliances. I am just constructing another machine of 3 x 3 x ⅜ T steel, and this machine will be a combination of lathe for boring gun barrels, punch, shear, screw cutting and nut tapping, turning and forging press for small articles, as screws, etc. I also do some plumbing work.

F. H. GIERKE, South Australia.

Tempering Planer Knives and Welding Springs.—As I have been helped numbers of times by articles from "Our Journal" and have never given it a single word, will endeavor to help Brother Bernard Schickling with his planer knives. I do a great deal of tempering and never have any trouble.

First heat the blade to an even dull red (be sure the heat is even all through), and then lay out to cool of itself. After it has cooled, reheat to an even dull red and plunge in oil with edge down, but do not cool much above the slots, as they will break off when clamped to the head.

After you have cooled it, move it over the fire and draw to an even straw color, and you will have a knife that will cut anything in reason. I temper scores of



A HANDY CALK WRENCH

them with perfect results. Only by a great deal of careful thought and study, however, can any man ever become a successful steel worker.

I agree with Brother Sidders of Ohio. E. Z. is the best compound on the market, I believe. I weld hundreds of auto springs with it, and they stand as good as a new spring, and I have a reputation for fifty miles' round on automobile springs. Even heating in welding is as essential as in tempering. Be careful in preparing your scarf and in your heats and you will make a good weld every time.

W. R. HUNTER, Georgia.

Welding Drills in South Africa.—We proceed as follows. We get our thirty drill-shanks jumped (or staved) up and scarf each one under the steam hammer as each one is sufficiently jumped. Then when the thirty are all staved and scarfed we do the same to the steel. I may say, by the way that the scarfs must be as short as possible for steel. When all the sixty ends are ready for welding, we get a nice clean well-coaled fire ready (no coke is used unless the coal happens to be very fine) and we start welding. While we are heating, we place another couple on the top of the fire so that we can get our thirty done comfortably in the nine-hour shift and also allow for any mishaps. We use the sand from the rock shaft of a gold mine as a flux, and it gives results as good as borax. It is fine, white and clean, and has given entire satisfaction. With due care in watching heats and also in working your weld under the hammer a fine, strong, clean weld is made, with scarfs well home and a nice clean taper from the steel to the shank. Trim off neatly at the anvil with top and bottom swage at the corners of the steel and a few blows with the flatter. Seven can be comfortably welded in an hour.

I wish to thank Mr. Benton for his excellent recipe for cracked hands. My Brother and many friends also swear by it.

I might say that we have eleven fires in this shop, and I am working a night shift on the drill welding.

L. G. REID, South Africa.

A Letter From an English Smith.—I have been a reader of your journal for over two years and have a very good opinion of it and think every blacksmith would do well to read it. Although the American methods are not applicable in this country, there are plenty of useful hints and tips to be gotten from the paper, and the man who reads it is a wiser man. I enjoy reading it from one end to the other. I think the general blacksmith has to be an all-round man, ready to adapt himself to any job that comes along. I do not know of any journal published in this country for the blacksmith.

I work for my father, who employs in addition two men and a boy. The shops are a long way behind the American; very few having any mechanical power at all. They are not combined; the blacksmith and the wheelwright each runs his own business. The special tools and machines, such as the power hammer, hooping machine, cold tire setter, punch and shears, are mostly to be found in the larger shops of the towns, but are far too costly for the average smith. It is just a matter of working on here as long as you can with very little chance of making any profit. The smiths cut one another's prices, and while an association was formed a few years ago the smiths did not adhere to the price schedule and it soon failed.

As I am interested in automobiles I would like to see information in "Our Journal" on the running of shops where automobile repairing is done in connection with the blacksmithing, and to know if there are good prospects in the business.

FRED CORBRIDGE, England.

Appreciation and Some Suggestions.—I wish to express to you my appreciation of THE AMERICAN BLACKSMITH. Very few men have more reason to appreciate it than I As I completed my apprenticeship on a Saturday and on Monday morning started in business for myself I never had the advantage of others' experience, except of those who have worked for me. "Our Journal" brings readers in touch with one another and I have received substantial help in this way. I think that every craftsman should take the journal, and the long-time subscription is a good investment. I consider mine as part of my shop stock, always worth one hundred cents on the dollar. I was very much interested some time ago in a description of the country blacksmith shop, which was an excellent account of the same, but let that kind of a shop be a thing of history and sink into oblivion. The up-to-date shop is no longer a place for the accumulation of dirt and soot, nor is it a storage for the accumulated junk of years. The windows have long since ceased to be the paradise of the spider where he remained unmolested to catch the silly flies that got too inquisitive. The free use of the broom on the walls and floor and scouring soap and water on the windows make the place look as if it was inhabited by a live person. Fellow craftsmen, we should not take a second place in our municipalities. We have a right to be heard. Our moral and political influence will be felt if we desire it. Let us uphold the good old trade. This means "prices" along with the rest.

I. J. STITES, New Jersey.

Fast Shoeing in England.—I notice there are some clever men in different parts of the States who are quick at shoeing, too

quick to my way of thinking. For a man to take off four shoes, fit four new ones, knock them on and finish in less than five minutes is an impossibility. They should shoe some of the horses in this country. Even at the "Royal Shoe," the largest and best exhibition held in England, where they have shoeing competitions, the shortest time allowed for a man to take off one fore shoe, make a new one and put it on, and also one hind shoe, including the preparation of the feet, is thirty minutes. That is the quickest and best work.

Making Buckles.—Referring to Brother Hollinsworth's request for information on buckles, I have the following to offer: If he can work out the length of iron he would have to cut off for each he can proceed as follows—make them in the shape of a ring. Should it be necessary to place the weld at one corner, there should be no difficulty encountered by taking a mandrel or long drift with a hand hold to it and marking on the drift the distance it would have to go through to make the buckle the required size. The drift could be driven through the ring. The ring, however, would have to be white hot and so much of a size as to allow the drift to drive in tight so that the sides would come in tight to drift as the four corners were formed.

S. COCHRANE, England.

A Special Case of Shoeing.—Regarding the four year old colt about which Brother Walton of Utah has written which travels wide in front, would say, make a sideweight shoe, but put the weight on the inside. If he has weak or low heels, make a sideweight bar shoe and roll the outside of shoe, sideweight inside. Use your own judgment. If necessary you may put a little side calk on at the heels, but use no toe calk. Get the foot to line up to proper angle of pastern bones. They may not straighten up with the first shoes nor the second, but keep close watch and get the necessary weight on the inside and in several shoeings you will succeed in getting the colt going right.

Pay for Overtime.—Important as good horse shoeing is, the average horse owner or driver gives little consideration to the subject of selecting a craftsman who knows his trade. Business people are anxious as a rule to keep their men and teams busy throughout the day and have their shoeing done evenings, and blacksmiths wishing to secure new business and hold trade are obliged to work early and late for the one price only. Other tradesmen working overtime get paid accordingly, and I feel the overtime jobs. Customers are usually in a hurry to get their work completed, but are not in a hurry to pay their bills. The blacksmiths of this section have no system, working early and late, and I will be glad to hear of terms and systems through the columns of this paper of other sections of the world in the blacksmithing line.

A. M., Pennsylvania.

Does Not Favor Cold Setters.—I am sorry to note that one having so much experience at the blacksmith trade as Brother Moule should say that there is guess work about setting a tire. I take off the tire and repair partly or fill the wheel as needed, put on new rim, saw out as required. I rim my wheel with a patent traveler wheel. I set my register and then rim my tire, also mark it. Then put the tire in a forge made for heating tires, which gives one a red heat all round of the same temperature. In the meantime I can mark hub just exactly the dish I am going to have to a sixteenth of an inch. I know exactly what I am doing, and would not have a man in my shop who had to do any guess work. For this reason a cold tire setter is impracticable for it is guess work and I can prove that it shortens the life of a wheel to less than one half. To make a draw between every spoke you can come nearer setting the tire correctly, but then the fibre or tissue of the iron is crushed and left lifeless. Where the rim slips on, the tire in a draw the wood fares like the tires. Where it has any glue or rust it sticks to the tire and crushes the spoke tenon, and widens at the holebored in the rim. (Put your calipers on any time you draw on and you will see). So according to a close and watchful examination of the cold tire setter I feel that it is positively against nature. Ask any iron and steel expert and he will tell you that iron or steel contracted or expanded receives a broken center and ruins it for strength. I have given both methods a fair trial, and would not give a cold setter shop room.

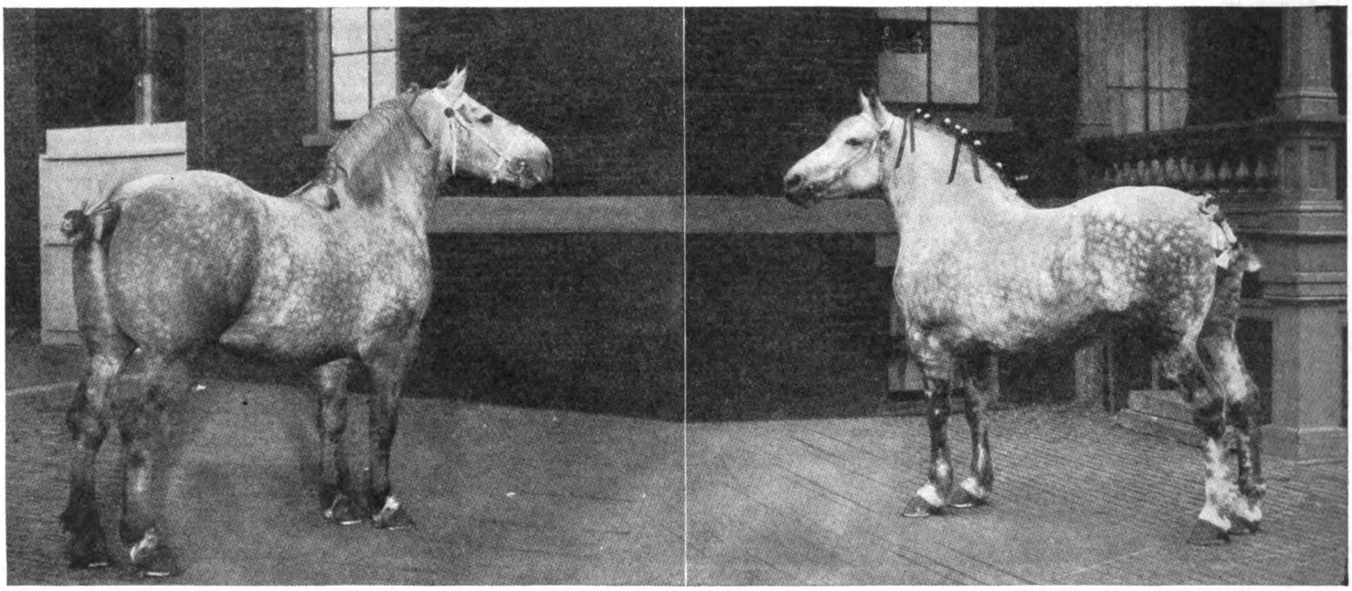
J. W. HUNTER, Florida.

Another Cold Tire Method.—The letters of brother blacksmiths on cold tire setting are both interesting and amusing. In my judgment Brother C. H. Moule is a levelheaded smith. The reason so many smiths in Texas condemn the cold tire-setter is because they turn the tire setter over to incompetent operators and consequently have poor results. Mark the statement of Brother Moule that customers said, when the tire setter was first introduced, that when the wheel became wet it would pull back or rebound and be loose again. This is like some old blacksmiths who still make their own horseshoe nails because they claim factory-made ones are dangerous, rotten or brittle.

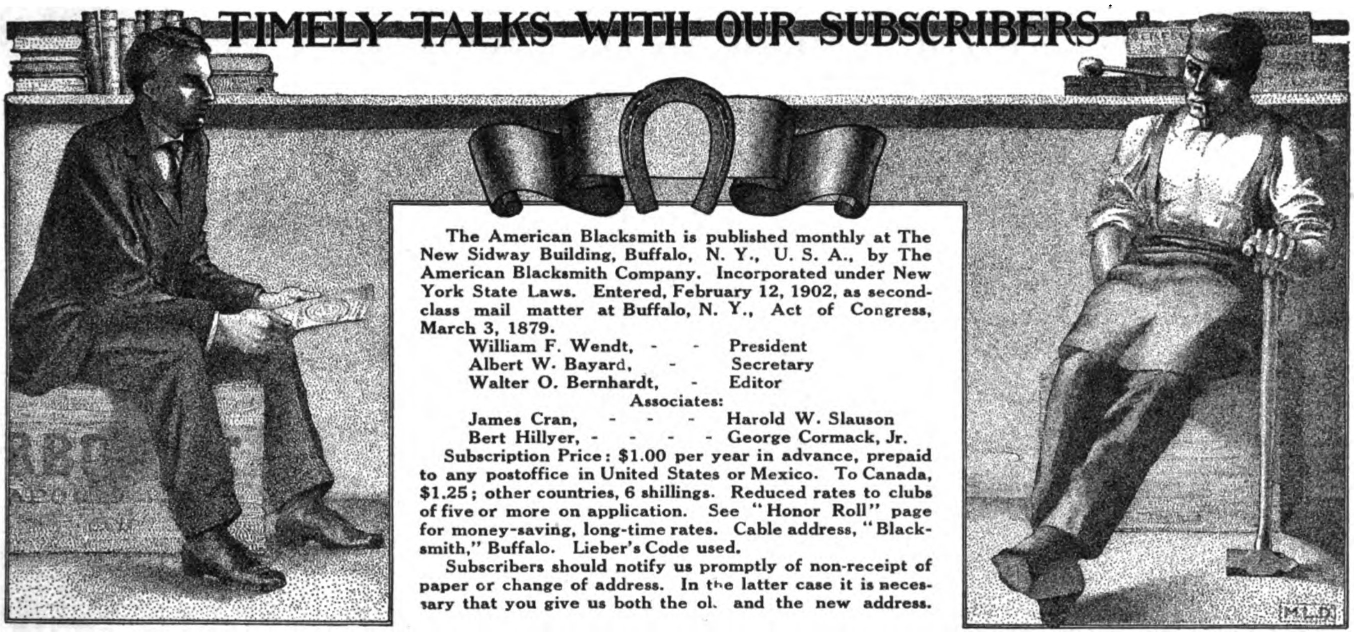
Proceeding as follows, my helper and I can do a set of buggy tires in from thirty to forty minutes and have a job which I do not believe any smith anywhere can ordinarily duplicate with his hot setter. Of course if a customer persists in having them set hot I do it, but I sincerely believe there are four wheels ruined by the hot process to one by the cold. The above refers to the summer season when the wheels are at their worst, loose in hub, rim, tenon and tire.

If the spokes need wedging, (which is not always the case), I will take it to my tire bolting machine, take the tire off, wedge the spokes and make other repairs, slip the tire back on again, put in the bolts (only starting the nuts so as not to fall off). Next I put my disher on the wheel which is a special patent for the use of which I gave five dollars. This is put on the wheel from the back side by the spindle going in the boxing and a small disc or plate being held away from the hub by the outer end of the spindle which also has a crank on that end just beyond the disc with threads on this spindle. Then there are four chains with grab hooks on them which I lock around the rim in four equally divided places after pulling or holding the wheel in that position as the case may be. I now proceed to grip the tire in never less than two places and sometimes four, and at the same time while shrinking I use a small or light hammer and hit directly over the spokes, all of them, thereby forcing them right down in the hub where they belong. I shrink until firm. Then while my disher, or anti-disher as you choose to call it, is on the wheel, I take the wheel to the anvil where I have the proper sets for the hub rivets and proceed to tighten them by hitting lightly (that is if they are loose in the hub.) Next I take it to the tire bolting machine, tighten the bolts and cut off the ends.

D. W. MURPHEE, Texas.



TWO CHAMPION STALLIONS, PRIZE WINNERS AT THE CHICAGO INTERNATIONAL EXPOSITION FOR 1911—THESE ANIMALS ARE THREE YEARS OLD AND WEIGH 2,200 POUNDS EACH



TIMELY TALKS WITH OUR SUBSCRIBERS

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A Good Suggestion

Here's a letter we received from a reader down in the big Lone Star State. It should be an example to other readers. It is an example of big heartedness—an example that we can all follow with profit to ourselves. There are a few suggestions in this letter that the writer of it has given out and passed on for the good of the craft. And then, too, he says a good word for "Our Journal."

Here's the letter;

"To be an up-to-date blacksmith, I consider THE AMERICAN BLACKSMITH essential; for it keeps us posted with new ideas through the articles and ads along our line. I think that all blacksmiths should carry a sideline suitable to their trade. I carry plow and mower extras, pipes and fittings and sell gasoline engines. Would suggest that smiths living in touch with wholesale implement houses buy condemned wheels and repair them for local trade. I find it quite profitable. I use power and recommend the use of it, but study when to use it for profit and don't allow the use of it unless it pays."

A. E. HIESTER, Texas.

This Texan didn't think of himself alone. He made his suggestions for the good of the craft. Take an example from this letter—let us have suggestions from you—things you have learned through experience.

Subscriber's Service

One of the features of our subscriber's service is to tell them where to buy or get what they want. If you are in need of any shop equipment—need tools, machines or supplies of any kind, let us know about it. Tell us what you want and about when you will want it, and we'll do the rest. It makes no difference whether or not the material you want is advertised in "Our Journal", we can and will tell you where to get it. If you want information about some machine or tool, if you want prices, descriptions, catalogs or anything else connected with the smithing craft, tell us. If you are in the market for a machine of any kind, instead of writing six or a dozen letters to all the manufacturers of that machine, write one letter to us. Tell us what you want and we will write to all the makers whose machines are likely to interest you. So ask us to put you in touch with manufacturers of the equipment you want. It's part of our service to subscribers.

Contents, July, 1912

According to Ayer's

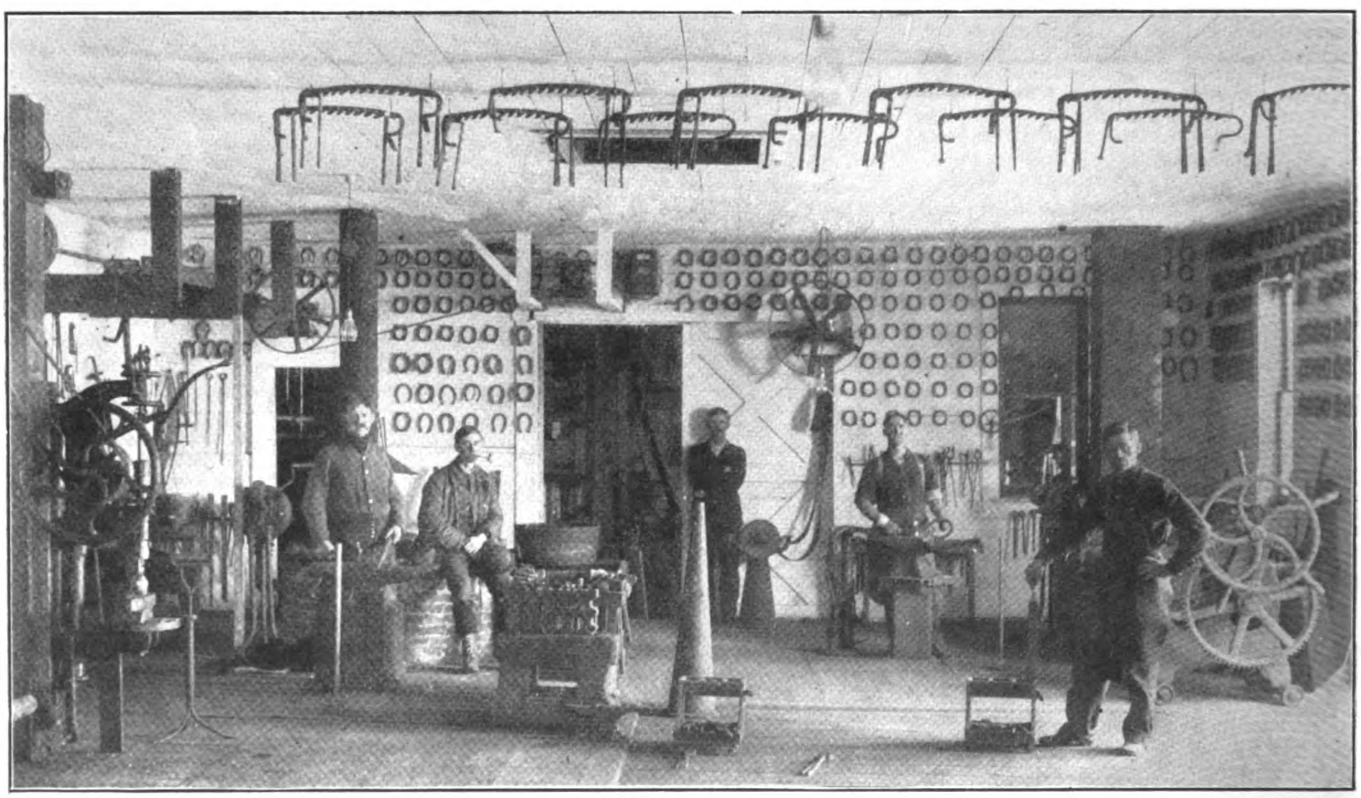
The American Newspaper Annual and Directory, published by N. W. Ayer & Son, is to the publishing world what the unabridged dictionary is to the English language. It is a catalogue of American publications. The forty-fourth year of continuous publication brings us the 1912 edition of this authoritative work, listing 24,345 publications. And in this latest edition of this authority on circulation matters THE AMERICAN BLACKSMITH—"Our Journal"—holds first place in its field. The directory shows that THE AMERICAN BLACKSMITH has more than twice as many readers as any other smithing, shoeing or vehicle journal, and over three times as many readers as its oldest competitor.

And this record, this showing, placed beside Our Honor Roll, is indisputable evidence of the prestige enjoyed by THE AMERICAN BLACKSMITH. More than twice the number of readers of its nearest competitor, and hundreds of its readers paid for years in advance—that's the record of "Our Journal." A paper must be worth subscribing for and reading, with such a record. Tell your neighbor.

Preserve Your Back Copies

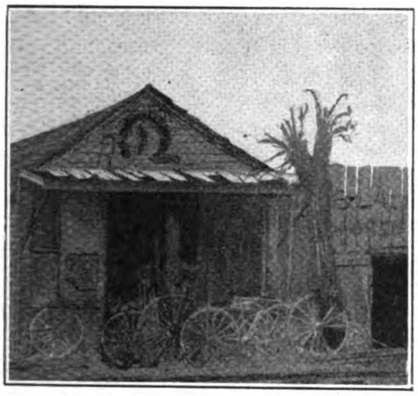
We can now supply serviceable binders for holding copies of THE AMERICAN BLACKSMITH. These binders are of a proper size to hold over a year's issues with the advertising pages, of course. They are very strongly made and with average use should last a lifetime. Each binder bears "THE AMERICAN BLACKSMITH" in gold on the front cover, and as the binder is finished with black binders' cloth it is very neat in appearance. The device for holding the copies in the binder is very simple and allows you to add or to remove a copy at any time without trouble or delay. Certainly a device of this kind is worth 80 cents! Try one, see how it works, use it for the present volume, adding the new numbers as they come to you and then put those back numbers in binders where they will keep clean, flat, and in perfect order. Our files of back numbers for office and visitors' use are held in these binders. We use a binder for each volume of twelve numbers, marking the back of the binder in red with the number of the volume.

THE HORSESHOEING END OF MR. WILLIAM CARTER'S IDAHO GENERAL SHOP WITH AN ELECTRIC-MOTOR-DRIVEN FORGE



THE BLACKSMITHING MACHINES IN MR. CARTER'S SHOP ARE OPERATED BY AN ELECTRIC MOTOR. THE MACHINES OF THE WOOD SHOP ARE OPERATED BY A FOUR-HORSEPOWER GAS ENGINE

A WELL-EQUIPPED GENERAL SHOP OF IDAHO



The Modern Smith Shop

How It Contrasts With the Smithy of Ten Years Ago

ROBERT H. TURNER

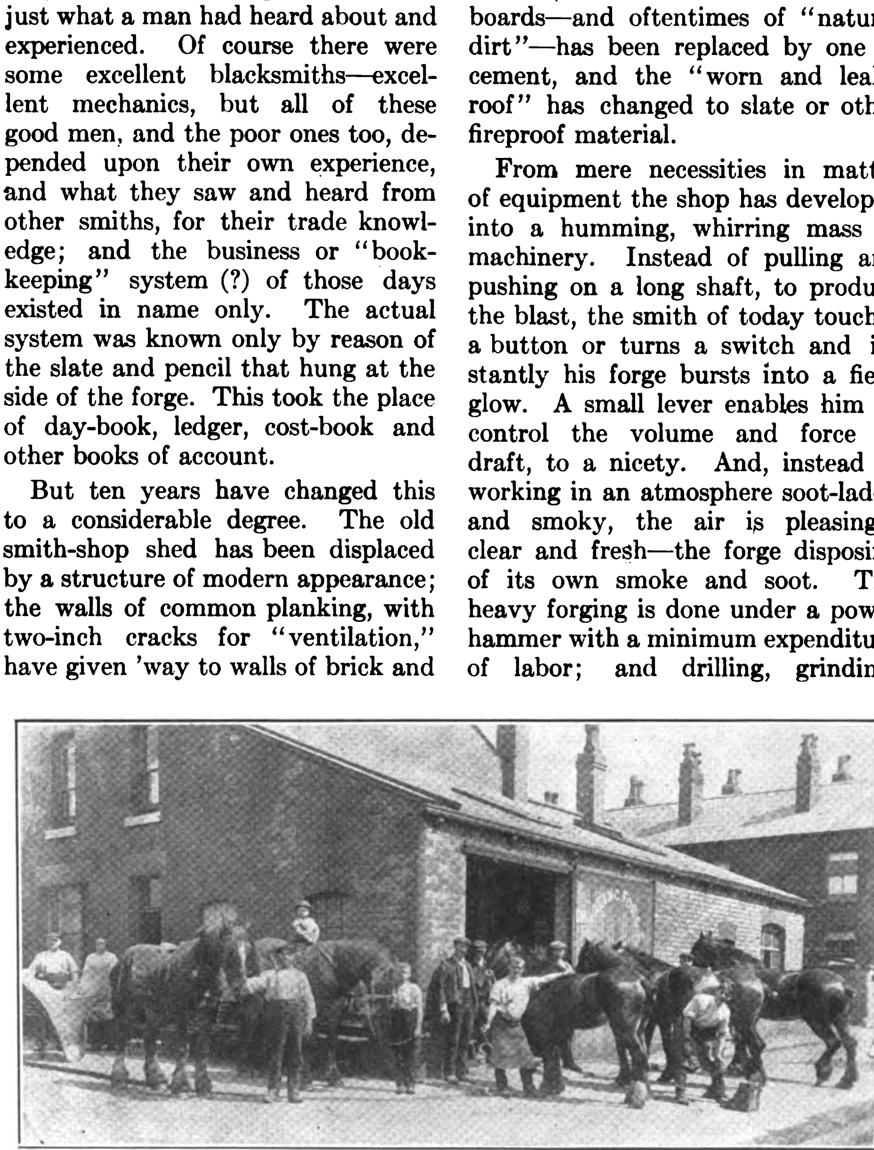
TEN years in the age of a craft like blacksmithing isn't long—a craft that had its beginning in the time of Tubal Cain; a craft that counts its age in centuries, not years. And yet the past ten years have seen wonderful changes within the trade. There has been a wonderful jump forward. We find new shop buildings, new tools, new machines and new life in the craft.

Ten years ago the smith usually established himself in any old building which was no longer suitable for other uses, and many times it was not suitable for even smith-shop use, but the rent was low—and so was the building, generally—and here with anvil, hammer and forge the smith did his work. Few, if any other tools did he possess; and if he did have others they were all hand-operated; for it was an exception, ten years ago, to find a smith shop housing a gas engine. The gas engine was just beginning to find its way into the smith-shop. The manufacturer was just beginning to seek the smith as a possible buyer, and the smith was waiting to see if he could afford to install an engine. Today the smith knows he cannot afford to be without a gas engine or motor.

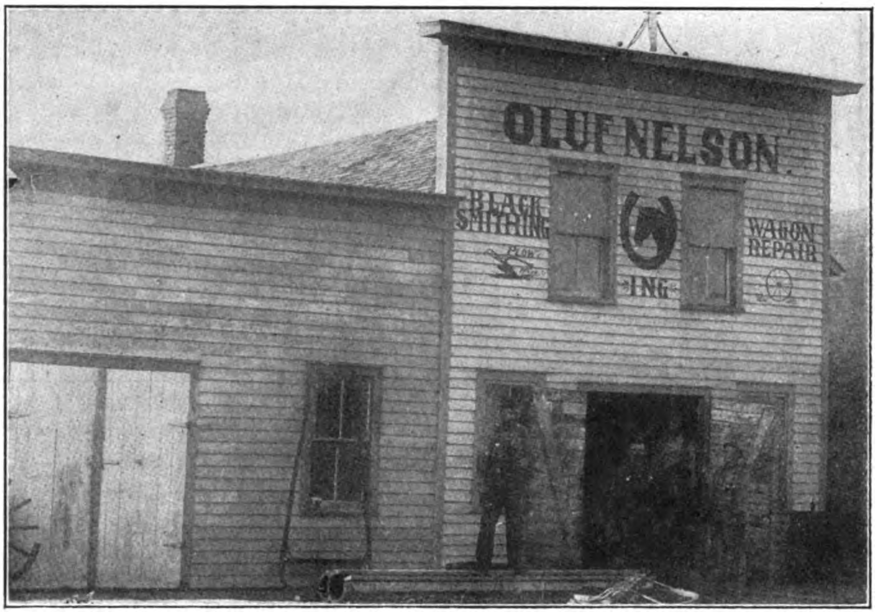
The average of the craft has taken a decided upward turn. Ten years ago the average smith-shop building was far below the average shop of today. The building was generally an old barn, the equipment seldom more than just enough to do the work slowly and laboriously, the methods of doing business careless and systemless, and the knowledge of the trade just what a man had heard about and experienced. Of course there were some excellent blacksmiths—excellent mechanics, but all of these good men, and the poor ones too, depended upon their own experience, and what they saw and heard from other smiths, for their trade knowledge; and the business or "bookkeeping" system (?) of those days existed in name only. The actual system was known only by reason of the slate and pencil that hung at the side of the forge. This took the place of day-book, ledger, cost-book and other books of account.

But ten years have changed this to a considerable degree. The old smith-shop shed has been displaced by a structure of modern appearance; the walls of common planking, with two-inch cracks for "ventilation," have given 'way to walls of brick and cement; the floor of "well-burned" boards—and oftentimes of "natural dirt"—has been replaced by one of cement, and the "worn and leaky roof" has changed to slate or other fireproof material.

From mere necessities in matter of equipment the shop has developed into a humming, whirring mass of machinery. Instead of pulling and pushing on a long shaft, to produce the blast, the smith of today touches a button or turns a switch and instantly his forge bursts into a fiery glow. A small lever enables him to control the volume and force of draft, to a nicety. And, instead of working in an atmosphere soot-laden and smoky, the air is pleasingly clear and fresh—the forge disposing of its own smoke and soot. The heavy forging is done under a power hammer with a minimum expenditure of labor; and drilling, grinding,



MONDAY MORNING AT THE SHOEING SHOP OF MR. J. RIGBY, BOLTON, ENGLAND



BEFORE THE FIRE—MR. OLUF NELSON'S GENERAL SHOP IN NORTH DAKOTA

punching and shearing are done quickly and excellently on machines instead of in the old, slow, laborious hand method.

In the actual conduct of business, the slate-and-pencil system has been relegated to the scrapheap; and in its stead a modern system of book and cost-keeping is being established. The practical smith is becoming a practical business man. He is learning the difference between figuring a profit on the selling price and figuring a profit on the cost. He is learning that profit and loss are not always what they seem. He is learning that costs are at times somewhat more than he has been figuring. He is learning that ignorance in figuring costs does not make a loss any less; and, as a consequence, the smith of today is making a profit or he knows the reason why he is not. His cost system is telling him where the leaks are—and when a business captain knows where the business ship is leaking he knows how to stop the leaks.

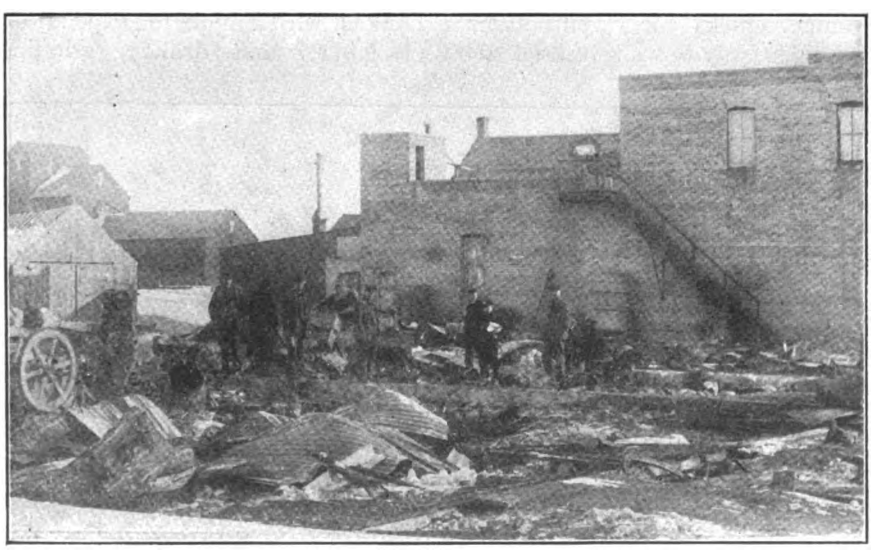
Even the man at the forge has changed. It is a long cry from Longfellow's hero to the modern smith of today. We have nothing but praise for the "Grand Old Men of the Craft"—the men who served their time faithfully and were excellent mechanics. To these men must the modern smith bow his thanks for the perpetuation of high craft ideals; and to these men must the coming years always be thankful for many things. We are sorry to see these grand old craftsmen gradually laying down their hammers and taking off their aprons. There are comparatively few of them left,—and every day the press tells of additions to the great army of craftsmen who have gone to a well-earned reward.

There was another style of so-called old-time smith, but happily we can say he is fast disappearing and there are few taking his place. This was the Old-time Jack-of-all-trades who knew a little of this and that and did them all—sometimes well but most times poorly. He was a tinkerer; and when anybody wanted some tinkering done on anything from an old pair of rubber boots to the tin roof over the chicken coop this chap was the one they called on. But the old-time tinkerer is going, and in his place is a bright-eyed, clear-faced blacksmith, who is not only doing good blacksmithing, but he is studying it too. He is the man in the modern cement shop with its battery of motor or gas-engine-driven machines. He knows how to do business in a business way—knows a good deal about

THE SHOP OF MR. GEORGE McLEOD—HE'S FROM MISSOURI

blacksmithing and is learning more every day. He is clean in mind, body and soul—takes pride in being able to breathe a pure breath and in upholding things that are good and right.

Upon this man depends the future of the craft, and needless to say we are not one whit afraid of the future.

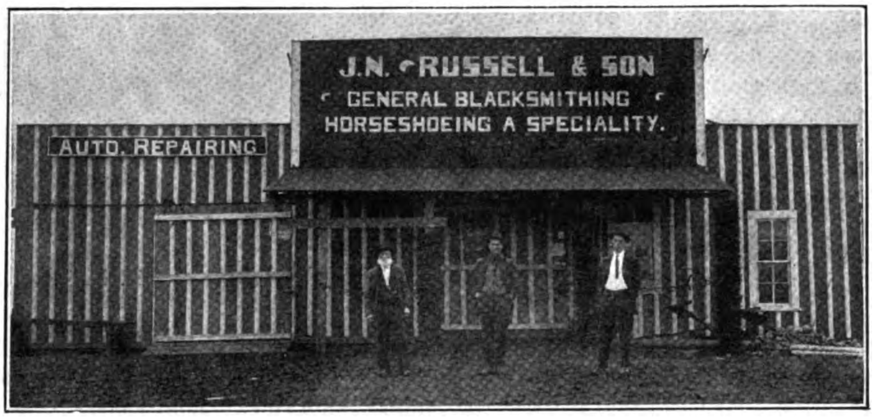


AFTER THE FIRE—WHAT WAS LEFT OF MR. NELSON'S SHOP AND POWER EQUIPMENT

A Texas General Shop Well Equipped With Power Machines

W. O. Russell

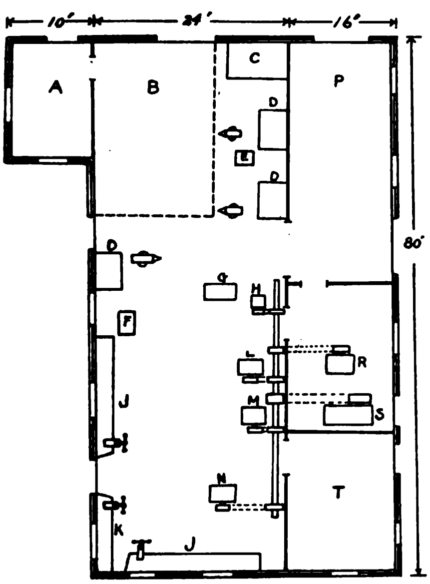
I am sending you photo of our shop, which is 50 by 80 feet in size, and equipped with a 10-horsepower Weber gasoline engine (which I consider one of the best on the market), 18-inch French buhr mill, an emery stand, a band saw, a planer, a rip saw, a cut-off saw and a drill,—all



A TEXAS SHOP FROM THE OUTSIDE—THEY DO AUTO REPAIRING AND GENERAL WORK

power machines. I do not understand how a blacksmith can run a shop without power. We also have about all the tools necessary for a shop of this size; among them a House cold tire setter and a Reynolds tire bolting machine that I would not do without for double the price we paid for them. Have also three forges all equipped with Royal H. blowers that are giving perfect satisfaction.

Our auto garage is small, but we do a nice business in this line. We handle gasoline, cylinder oil, polish, etc. I would advise all blacksmiths where there is not a garage to make preparations to handle the auto-repair business, for the automobiles are here to stay, and the blacksmith is the right man to have the profits from the repair business. I am also enclosing a floor plan of our shop. A represents the office; B the shoeing



THE FLOOR PLAN OF J. N. RUSSELL AND SON'S GENERAL SHOP

floor; C the coal bin; D, D, D the forges; E vise bench; F tire bolting machine; G tire setter; H drill; J, J wood benches with vises; K bench with pipe vise; L band saw; M emery stand; N planer and saw; P garage; R mill; S engine, and T represents the stock or material room.

A General Shop of New Zealand

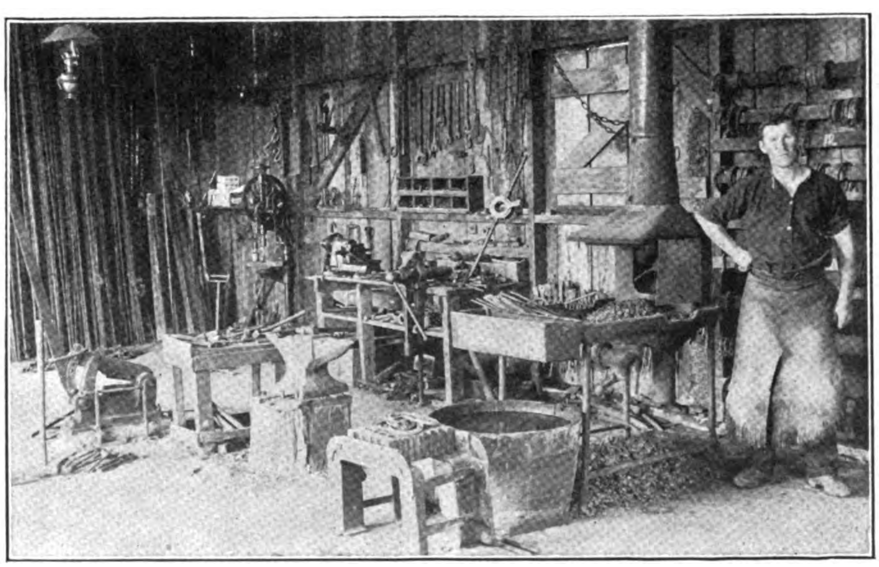
E. C. Jones

I send you a small photograph showing one corner of my shop. I do shoeing and general smith work. I am afraid I am not quite so fast at work as some of my fellow craftsmen, but I have the best shop within sixty miles and carry an extensive stock. My shop, in addition, has a concrete floor for shoeing, and find it very serviceable in wet weather. We do not have frost or snow here. I find many things required in your country do not suit here at present, as this is only a new country.

A Well Equipped Power Shop of New Zealand

E. A. Knapp

I am centered in the largest fruit and hop-growing district in New Zealand. Beside fruit growing there is also farming on a small scale, grain growing, etc. I do all kinds of work; such as making and repairing farming implements, binder and mower repairing, horseshoeing, motor car repairing and coach smithing in all of its branches for the woodman who leases part of my shop. I also take by contract small bridge ironwork; the largest I have had being a ten-ton job. My equipment consists of a shop with two forges operated by two hand blowers, one small hand drill, one power drill, one Little Giant power screwing machine, one hot tire shrinker and welder, one Brooks cold tire setter, one pair of shears that will cut up to three and a half by three quarter flat and one and a quarter round (this I made myself, it is of my own design), one punching machine, that punches a half-inch hole, which is also my own design and make, one emery wheel, two sets of hand stocks and dies for bolts, one set of pipe dies up to two inches and one National Cement Company's four-jet brazing forge, which I use for Weldarine brazing all cast-iron work. I have also a good set of all the smaller tools both for bench and forge work, and last but not least a six-horsepower oil engine. As a rule I keep three helpers, two apprentices and one journeyman, but lately have



MR. E. C. JONES, A NEW ZEALAND CRAFTSMAN WHO OPERATES THIS SHOEING AND GENERAL SHOP

been working a man short, to cut down expenses.

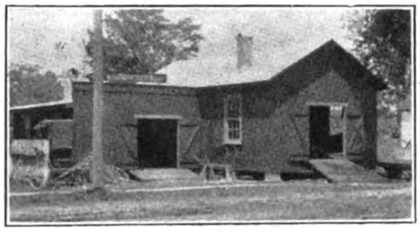
I appreciate THE AMERICAN BLACKSMITH very much and look forward to its coming. I enjoy the criticisms, especially on cold tire setting. I took special notice of these both before and since I got my own machine, and I am not sorry I decided in their favor, as I consider mine a complete success, notwithstanding all contra criticisms. I have also acquired much useful information, and I feel that if I lost the Journal I should lose a helpmate that I can ill afford to do without.

A Blacksmith and Wheelwright Shop of North Carolina

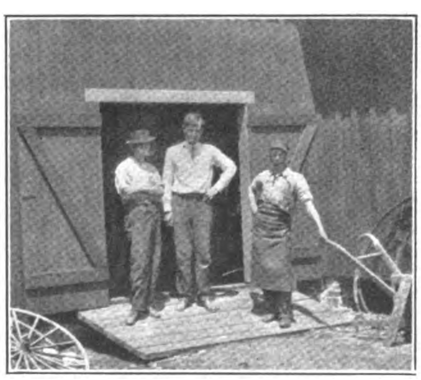
R. L. JONES

The photograph shows my blacksmith and wood shops which I have just built, the former 18 by 36 feet and the latter 18 by 22, built of wood with a galvanized iron roof. My equipment consists of a 2-horsepower Waterloo gasoline engine, a 20-inch band saw, a 6-inch jointer of my own make, a power emery stand and a foot emery, a drill press, a blower, a tire bender, a tire upsetter, an iron shear, a swedge block, a mandrel, a leveling plate, a heavy grindstone, a blacksmith and woodworkers' vise and many other tools too numerous to mention.

I have a large trade, but the prices while fairly good are not quite high enough. If it were not for the "quacks", the good mechanics would be able to get better returns for their work. I have very little trouble in making collections. I have been in business for myself the last ten years and have never lost ten dollars.



MR. R. L. JONES' NEW GENERAL SHOP, OF NORTH CAROLINA



HERE IS MR. JONES HIMSELF WITH HIS ASSISTANTS

Australian Wagon and Smithing Prices

C. STEVENSON

I may say that this little town is a very prosperous place. Wheelwrights and blacksmiths get £4 ($19.47) per week for 47½ hours. The class of work done here is mostly wagon, dray and buggy work. This is a sheep country, and wagons are used to bring in the wool to the railway terminus. They carry from eight to twelve tons with a team of 22 horses. The axles on these wagons are usually 3½ inches, and the wheels vary from 5 to 8 inches wide and 1 inch thick; hind wheels, 6 feet high, front wheels, 4 feet 10. Top of wagon 19 to 20 feet long and 9 feet wide. The carriers get one shilling ($.24) per ton for every mile up to one hundred, and then it is reduced to tenpence ($.20) per mile for any distance over the hundred. A short time ago it was only tenpence per mile, with every carrier striving to secure a load. In fact, some of them paid the agents £5 ($24.33) for a good load. They formed a strong union, appointed a secretary, and all loading must go through his hands, and every one has to wait his turn. If he does not, he has to go to the bottom of the list, so it is fair to every one.

The squatters are experimenting with motor tractors, but they have not made a success of it yet. In time, however, I think they will be a success, for the roads of Western Australia are very suitable for them.

AUSTRALIAN WAGON AND SMITHING PRICES

Cutting buggy tires, for set of four	2£	($ 9.73)
Dray or wagon tires up to 3 inches wide	10s.	(2.43)
" " " 4 " "	15s.	(3.65)
" " " 5 " "	20s.	(4.87)
" " " 6 " "	25s.	(6.09)
" " " 7 " "	30s.	(7.30)
" " " 8 " "	35s. to 40s.	(8.52) to (9.73)
All tires under 3 inches, each	10s.	(2.43)
Saddlehorses, 4 shoes, machine made	8s.	(1.95)
Draught horses, 4 shoes, machine-made	9s.	(2.19)
Saddle horses, removes, per set	5s.	(1.22)
Draught horses, removes, per set	6s.	(1.46)
Wagon shaft or dray shaft	20s.	(4.87)
Spring cart shaft	15s.	(3.65)
New buggy pole and bars complete	5£	(24.33)

A Cement Block Shop of Wyoming

CHARLES GEORGE

Having been a subscriber to your valuable paper for several years I look forward to each issue, as there is much information to be gained. If a smith is willing to learn, and to accept suggestions from others, to him the paper is priceless. I note that some readers object to the information appearing on auto-repairing, and desire more plow work, others desire more on horseshoeing, etc. I say give us what you have and lots of it, and each one can accept that which interests him principally. I am very sorry to see that some brother craftsmen are so sarcastic when another asks a straightforward question. Why is it that so many smiths are doubtful of another's word?

I have been in my present shop for the past three years. It is built of cement block with a cement floor, is 30 by 50 feet and is equipped with a Galloway engine, a trip hammer, a shoeing rack, a drill press, a disc sharpener, and a cold tire setter. I would not be without power under any circumstances, because with it I am ready at all times to get the work out promptly.

I am about as small a blacksmith as you will find, being only five feet in height and weighing 115 pounds.

I am entirely satisfied with my cold tire setter and can shrink any tire that comes my way except the channel tire which is for the rubber tire. Did good and quick work on buggy tires measuring ⅛ by ¾ and

also 2½ by ¾. If a man will use judgment he cannot help but secure good results. Sometimes I have set a tire in eight minutes, and then again it has taken me twenty to thirty minutes for a single tire. A smith who is contemplating buying a cold tire setter or installing power should first go where another smith has the same installed, see how they work, and how much lighter the work is, and then if he thinks it is all right purchase one. The time is at hand when the smith has to be more than a mere smith, to succeed. He must be a man with integrity, vim and, in fact, a business man through and through. Here is hoping that the blacksmiths as a whole will in the future be a respected and honored army of co-workers on whom the country in general can and will depend.

A WYOMING SMITHY OF CONCRETE OPERATED BY MR. CHARLES GEORGE

An Interesting Letter From South Australia

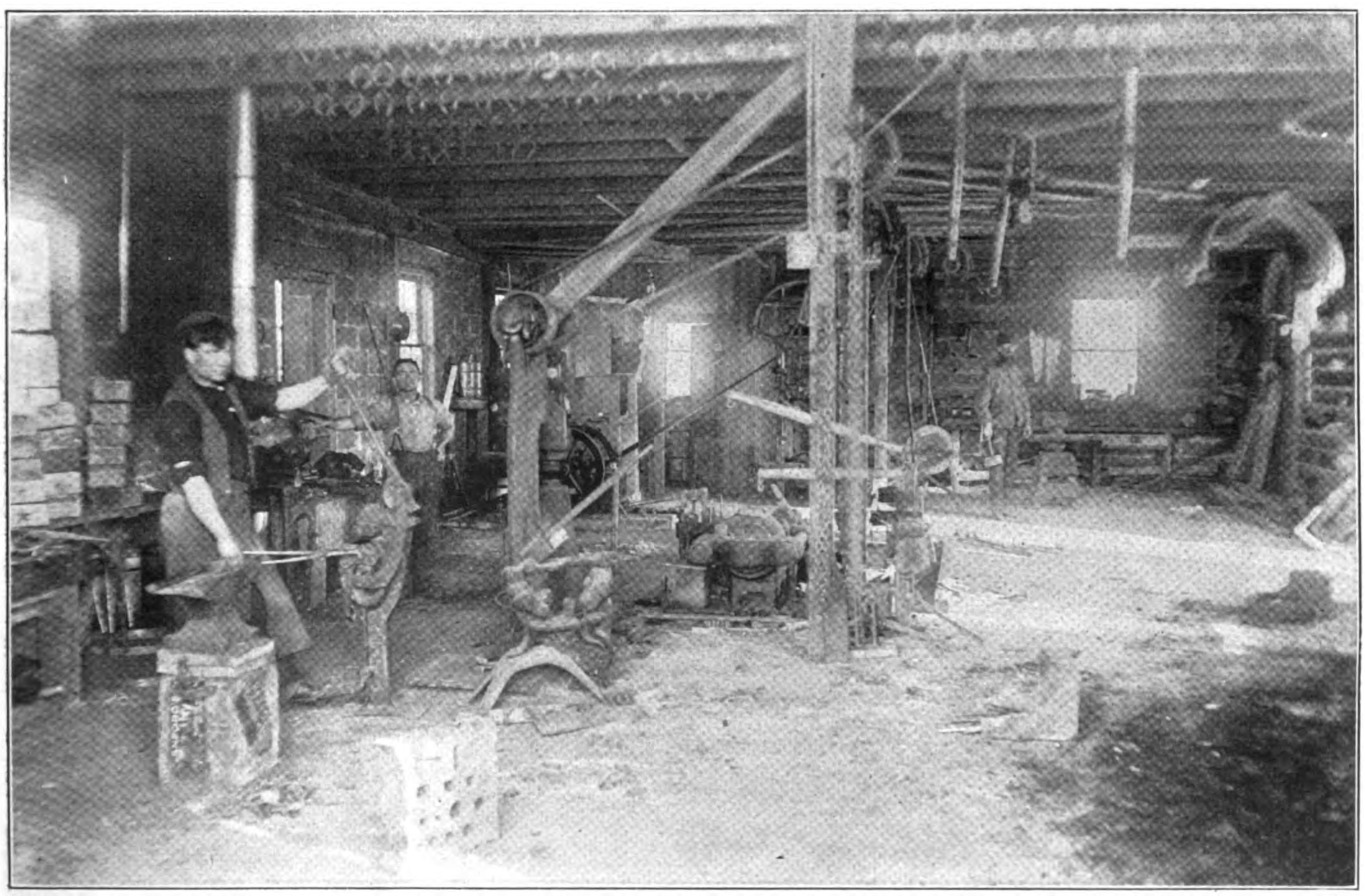
C. Luhrs

We are doing, principally, coachwork of all descriptions; from a wheelbarrow to a ten-ton wagon. You will see in our shop a buggy alongside a ponderous ten-ton wagon, all built by the same man. You see we do not specialize in one branch of the trade like you Americans; we have got to know the thing from beginning to end, and some beautiful work is turned out among our smiths, all hand-forged over the anvil. Very little is drop-forged in a country shop.

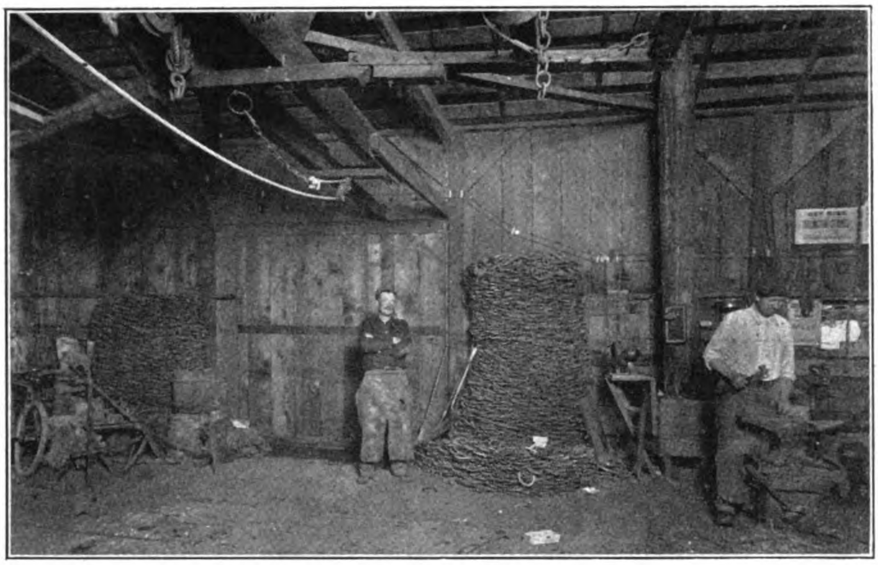
We live in a wheat and fruit belt; in fact, it is one of the richest tracts of country in the world, producing everything we need. We have iron ore in abundance, but unfortunately have to send it abroad to be refined into bars. Gold is mined not many miles away from the ironstone quarries. Copper is found twelve miles away. You can go for four miles and see nothing but grapevines and orchards. On the other side we have spuds, wheat and vegetables of all sorts. Plenty of forests produce most of our timber for wheelwrights, bridge-builders, piles for jetty construction, and railway sleepers. You can see red gum trees 300 feet to the first limb. The wood is cut for sleepers, heavy wagon felloes and wood for bridges. We have blue gum for shaft and bent work, stringy bark for frame work, sills, summer rails, poles, and the swingletrees look very similar to hickory, except it has small golden spots when varnished, but it is very straight in the grain.

We do a great deal of shoeing, because there's not much motor traffic here yet, too costly on our roads, consequently a lot of hauling is done by horsepower.

Ours is a power shop. We have a 14-horsepower Blackstone oil engine, a power blower for 3 forges, a 36-inch Silver band saw, an American drill press, a Sterling emery wheel, a power hammer, a Henderson cold tire setter and a Kirchner buzz planer (London make). What interests me is forging of fifth wheels, shaft jacks and couplings, jews-harp scrolls for back or cross springs, clip king bolts,



THE INTERIOR OF MR. GEORGE'S CEMENT SHOP SHOWS A MODERN POWER EQUIPMENT AND PROVES THAT GEORGE CAN DO IT



THE CALIFORNIA SHOEING SHOP RUN BY MR. W. M. CAMPBELL—THE PILES OF OLD SHOES SHOW THAT THE ELECTRIC BLOWER IS KEPT BUSY

equalizers for springs, skids for buggies and designs for rein and hand-rails from wrought iron. The people here won't have the malleable brass at any price. The American makes of vehicles do not take, in this country, although there are a lot of American vehicles, but they are too delicate for this side of the world and don't last long. We weld all our axles in the upsetter. We use no compound but good clean sand.

A Busy California Shoeing Shop

W. M. Campbell

The photograph of the interior of our shop exhibits two shoe piles, and seven shoe kegs full of heels which have been removed from new shoes. These shoes are very compact and we estimate the weight to be about seven tons. The pile on the right measures 7 feet high and 4 feet in diameter. The one on the left is 5½ feet high, 4 feet wide and 3 feet thick, and they have only been accumulating since December, 1909. Our trade consists principally of shoeing light horses; seldom using a shoe larger than a No. 3. We have two floormen, and shoe from 10 to 25 horses per day. Our prices range from $2.00 plain to $2.50 for calks.

A Power Shop of Nebraska

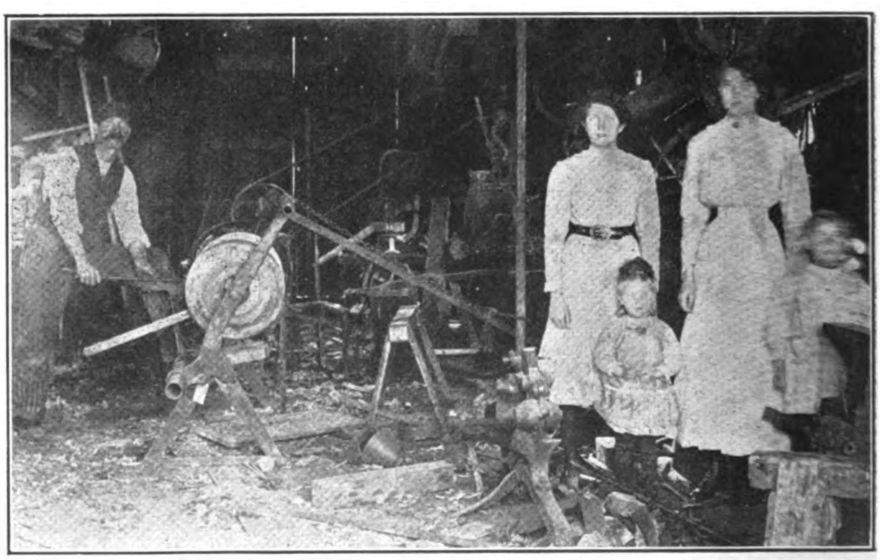
T. J. Hobson

Regarding cold tire setting, I don't like it myself, but it is a money getter for a smith, all right. I would get one if I did not have so much competition. This is a town of about three hundred inhabitants, with four shops, two of them having cold tire machines.

I saw an article on welding wagon tires in the April issue, and would say that I can weld a tire while that man is getting his tire ready to weld. I just cut it off in the shear, lap the ends about ⅜ of an inch and place it in the fire, take a good heat and weld. I don't scarf it at all.

Here is a little kink that might help some brother smith. When the forge fire gets low, so that it won't start without kindling, but is still hot, just throw a little oil on the hot coals, put a match to it and see how quickly you can get a fire.

What would that law amount to that would compel a man to take an examination before he could shoe a horse? It would be like the engineers' law and the oil inspection laws, etc.; if you had a little money you could pass all right, and it would only mean another position for someone, and the blacksmiths to pay that man's salary.



MR. T. J. HOBSON RUNS A POWER SHOP IN NEBRASKA. HE HAS SEVERAL OTHER HELPERS BESIDES HIS POWER MACHINES

The Old and The New in Australia

L. H. Strange

I am sending two photographs, one of my old shop and the other of the new. I am a smith myself and keep another smith on second fire, one head bodymaker and wheeler, one head painter and trimmer; all told, including myself, eight workmen. I keep about the same staff all the year 'round. My business has been very prosperous for the past four years.. I have a five-horse-power oil engine, one 32-inch band saw, one 30-inch circular saw, one 12-inch planer, one tire bender, welding machine, Hawkeye power hammer (a splendid labor saver), a grinder with two wheels, a large drill, and I have just bought a power paint mill with which we intend grinding all of our own colors. We are almost exclusively on light work, such as buggies, gigs, etc.

The Master Farriers' Association of Sidney, Australia

Thomas Russell

We are always pleased with The American Blacksmith. We enjoy

THE NEW CARRIAGE WORKS OF MR. STRANGE—A NEAT LOOKING SHOP WITH A GOOD DISPLAY OF WHEELS

some real good reading and derive a good deal of useful information. Even after we have devoured the contents of it ourselves it is passed along to some of our fellow tradesmen who are always pleased to get a glimpse of it. I might tell you that we have here in Sydney formed a Master Farriers' Association, the idea of which we gathered from your valued paper. Of course the journeymen here have a very strong union. Their wages are, firemen, £3-6-0 ($16.00) per week; floormen, £3-0-0 ($14.60) per week of 48 hours. They are also paid for all holidays as well as their annual picnic day. Previous to the formation of the Master Farriers' Union the men and masters were always at variance. But since the masters have formed a union themselves things are going along very smoothly. There is a great deal more harmony now than there was before the formation of the above mentioned association. Ninety-eight per cent of the employers are in our association. Previously we were only receiving four and five shillings ($.97 to $1.22) per set; now the uniform prices are, light horses, 6s ($1.46), and heavy horses, 7s ($1.70) per set.

I have a very good connection here. I have four fires constantly employed, which means in all eight men. I have two pairs of bellows and two blowers. We make all our own shoes.

Should I Buy a Cold Tire Setter?

By "Hot Spot"

For considerably over a year the pages of "Our Journal" have been filled with discussions on the cold tire setter and its advantages and disadvantages. We have read articles on both sides; some readers claiming they could not do without the machine, while others say they would not give the machine shop room. Now, wonders the man who has no machine, who is right?

If the cold setter is correct in principle and operation, why are so many smiths opposed to it? If the cold setter is not correct in operation, why do so many praise it so highly.

It is not necessary to go over the arguments for and against; you have all read them, and as far as arguments are concerned everything possible has been said. The question still remains, however, for the smith who does not own a machine: Should I buy a cold tire setter?

The question is one for the smith to answer for himself. His answer depends upon the smith himself, the work, the shop, the locality. Review in your mind the arguments advanced in all the articles upon the subject. If necessary, read over some of them. Is not that the conclusion? Does not practically every article point that as the answer? Some smiths seem to think that because a certain medicine has cured their rheumatism that the same medicine will cure the rheumtism of every other sufferer from the disease.

No doubt some fault with setters in some shops is due to the manufacturers. That seems strange, but I believe you will agree with me that it is true. The manufacturers in their eagerness for business have emphasized simplicity, labor-saving, big profits and time-saving; and the blacksmith has, in many cases, expected too much along that line. He has been expecting the machine to do its own work, pump the fire and collect the money. I do not say the makers have been telling "fairy tales" or anything of that kind, but they have told so much about their machines that in some cases the smith has been disappointed.

For example, the discussion brought out several instances of big savings and profits because of the machine. And some smiths have no doubt been told of these performances, which cannot be taken as average, but which some smiths have been

THE OLD ESTABLISHMENT OF MR. L. H. STRANGE—AN AUSTRALIAN CARRIAGE WORKS

MR. T. J. TRANKLE'S GENERAL SMITH SHOP OF MICHIGAN—THE "WORKING FORCE" IS STANDING IN THE DOORWAY

expecting. It would be better to surprise the smith with the machine's actual performance after he gets it than to tell too much and disappoint him. The machine can't run itself. Brains must be mixed with it.

A woman used to sewing by hand needs to learn several things before she can successfully sew with a machine. And a smith who has always set tires the old way needs to know several things before he can successfully set them cold on a cold tire setter.

A smith doesn't expect his gas engine to take care of itself. He must give it intelligent attention if he wants it to give intelligent service. He doesn't expect his drill press, power hammer or even his forge to care for themselves. He must give them intelligent attention and care if he wants intelligent work from them

And the cold tire setter is by no means an exception. It must be used intelligently. I know of no manufacturer who says his machine will repair broken tenons, yet some smiths seem to think that the machine will make tenons as good as new. No one has said the cold setter will fix up split felloes or hubs. I haven't heard or read anything about the cold setter putting in new tire bolts or making old ones as good as new. Yet some smiths have considered the cold tire setter a kind of "cure-all" for wheel troubles and breakages.

So the question is simply one for each individual to answer for himself the same as the question regarding the purchase of a gas engine, a power hammer, a power drill or any other labor and time-saving machine.

Another Case of "Who's to Blame?"

Here is a news item from a Washington State newspaper that will interest every shoer in the country. It again demonstrates the necessity of having some sort of agreement with your customer regarding the limit of your responsibility for his horse while in your shop.

What killed Charles Folin's horse?

This question is at issue before a jury and Judge W. W. Black in Superior Court today. Folin is suing for the value of the horse, the cost of veterinary services and medicines, etc., with Eric Walseth as defendant.

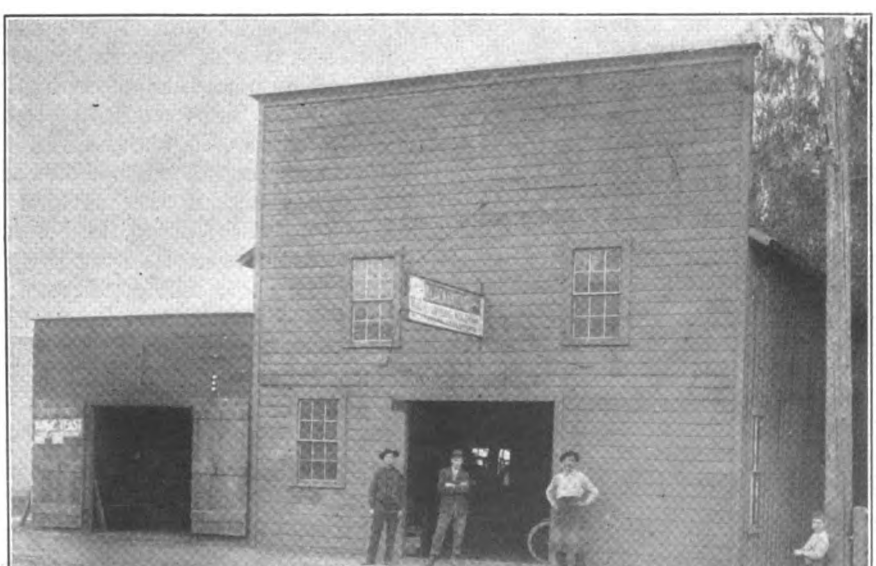
Walseth is a horseshoer at Stanwood; Folin is a rancher at Cedarhome.

Folin took the horse to Walseth to be shod. Walseth put the nag's left hind foot in a sling and drew it up alongside the horse's body—to prevent it kicking him. Folin says the horse was perfectly gentle and that this was unnecessary—but he didn't protest against it.

Then the horse threshed around on three legs, finally upsetting Walseth's anvil and falling on the horn of it, the long, sharp, conical steel penetrating the brute's left shoulder. Three and a half months later the horse died.

Two or three veterinaries worked on the horse in the meantime. One doctored the shoulder; another lanced the animal on the left hip; another furnished medicine. When the animal died it was suffering with ulcers about the head, and the defense claims it died from just common, plain, old fashioned glanders.

But—it's up to the jury to decide.



THIS CALIFORNIA BLACKSMITHING AND WAGONMAKING SHOP OF MR. W. M. GRAHAM IS OPERATED BY AN ELECTRIC MOTOR

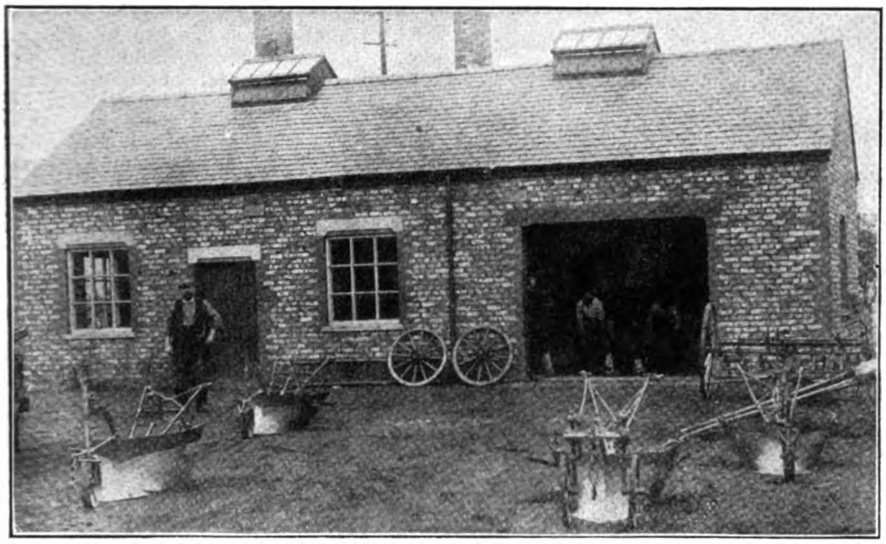
The Witch Hazel Crotch As a Water Diviner

C. J. Winston

Goldfields Diamond Drilling Co., Australia

As regards the find of water in Illinois, the writer put a hole down over the peg where the diviner indicated water and got a supply, but there was nothing marvelous about this, because there was a big body of sand overlaying a band of clay a few feet in thickness, and underneath this clay was sand and water.

The owner of the property had sunk a number of wells into the top body of sand, but was prevented from getting into the sand to any great depth, because it caved on him. He would have obtained ample water



A SUBSTANTIALLY BUILT ENGLISH SMITHY, RUN BY MR. THOMAS FAIRHURST OF CADISHEAD, ENGLAND

in the top sand if he had been miner enough to sink his well fifteen or twenty feet into the sand strata.

The writer had a previous experience of the kind at his own home where the divining rod expert took a peach limb to find the water.

If the writer's memory serves him right the diviner declared against the possibility of getting water where my father wanted his well, so the well was sunk without the benefit of the divining rod and we got water, and there was a supply of water for twenty years, to the writer's knowledge, and the chances are that it has been doing so for a number of years since (twenty years).

You can readily see the writer is not over enthusiastic on the virtues of water finders, he is too anxious to know the reason why of a thing, taking nothing for granted, and as previously mentioned he cannot find a satisfactory reason why (except from tired muscles) the rod would work.

The writer used the witch-hazel crotch in Illinois one time and, as it did not work, the excuse given for it not working with me was that it would not work with anybody not suffering with rheumatism. Naturally, I have not been very anxious to develop rheumatism in order to make the hazel twig work.

A Well Built English Smithy

The accompanying picture of an English smithy was sent us by Mr. Leonard Fairhurst of Rhode Island, with the following notation: "I am sending you a photograph of my father's shop in England. The plows in front of the shop are for banking celery and are used very successfully in our vicinity. These plows are manufactured in the shop which is well equipped with modern tools."

The shop shown is an exceptionally fine appearing structure, with its solidly built brick walls, slate roof and tile peak, and its liberal sized windows and the ventilating roof lights. It is such shops as this that we may well pattern after in this or any other country.

While the old makeshift shop buildings are gradually disappearing, there are still too many of them, and in changing from the barn-like sheds of grandfather's day we may profitably imitate this English smithy.

The Outlawing of Claims and Accounts and Their Revival After Being Outlawed

Elton J. Buckley

How and when is an account or a claim outlawed, is it in any way collectible after being outlawed, and if capable of revival and collection how can this be accomplished?

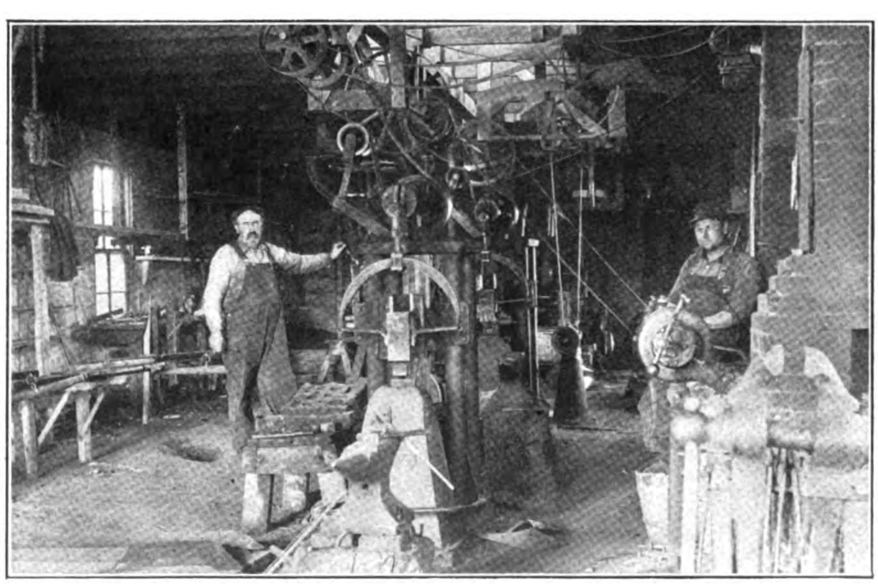
These are questions arising in the experience of any business man a greater or less number of times every year. Having some knowledge on the subject may be the means of avoiding loss.

A claim or account is outlawed when the statute of limitations has run against it. A statute of limitations is a statute which allows a creditor or the owner of a claim a certain time in which to bring an action for its recovery. If he fails to bring it within that time he cannot bring it at all.

The statutes of limitations differ in the different States very decidedly, and even differ from time to time in a given State. Probably more States outlaw an ordinary debt or account in six years than in any other period.

The statute of limitations begins to run from the minute the creditor could have begun his action. For instance, take a merchant who has sold a bill of goods on the ordinary terms, which usually means thirty days' credit. Say that the bill is dated January 1, 1910, which would make the account due February 1, 1910. On the latter date the merchant could have begun an action for the recovery of his debt, and on that very day the statute of limitations begins to run. If the period is six years he must sue before February 1, 1916, or he cannot sue at all. Only by the debtor's express or implied consent, as will be further on explained, can the claim ever be collected.

In the case of an ordinary promissory note dated January 1, 1910, at three months, the statute of limitations begins to run on April 1, 1910, because the note was due that day and an action could have been begun then. If the matter is allowed to lapse until April 1, 1916, without suit being brought, the claim will be uncollectible. In ordinary business parlance, it is outlawed.



A WELL-EQUIPPED GENERAL SHOP OF KANSAS, RUN BY MR. N. P. SMITH —GAS ENGINE POWER IS USED

MR. J. E. MAYS OF WISCONSIN DOES ALL KINDS OF SMITHING AND GENERAL WORK AND APPEARS TO KEEP BUSY AT IT

In the case of a note payable on demand, the statute of limitations begins to run the minute the note is made, because it is due then. In this case no demand is necessary to start the statute running. Where the note is payable so many days after demand, however, demand must first be made, and the statute does not begin to run until it is made. To illustrate the difference in principle here, take a note dated January 1, 1910, and payable on demand. On January 1, 1916, no suit having been brought, the note will be outlawed. But in the case of a note dated January 1, 1910, and made payable thirty days after demand the note is never outlawed unless demand is made. The reason is obvious: the date when it is due can only be fixed by making demand and then adding thirty days to that date.

It is a curious thing about the legal principles governing the operations of the statute of limitations that the outlawing affects only the remedy and not the merits of a claim. For instance, A owes B $50, which is outlawed because no action has been brought on it within six years. The claim is still perfectly valid, but it cannot be collected by legal process. This will strike the layman as peculiar and unhelpful reasoning, though it is based on sound logic and justice, which, however, need not be gone into here.

Just one other thing and I pass to the question of reviving an outlawed claim. In some States, though not in all, the statute of limitations does not begin to run if the defendant is not within the jurisdiction when the cause of action arose, so that an action could have been begun against him. That is so the creditor shall not be held responsible for not doing what, by reason of the debtor's absence, he could not have done had he tried. The statute begins to run when the debtor comes back and again places himself within the creditor's reach.

Now as to the revival of an outlawed claim. In a variety of ways it can be revived and collected, but only with the consent or voluntary or involuntary acquiescence of the debtor. Take an account which has not been sued on within six years, if the statute of limitations of the given State prescribes six years as the term, and which is therefore completely dead, so far as any legal remedy is concerned, the debtor can blow the breath of life into that claim in any one of say three ways, and it makes no difference whether he knew the claim was outlawed when he did it or not.

In most States the making of a part payment after the claim is outlawed will revive the whole and an action can be brought to recover it any time within another six years. The exceptions are States which require a written admission of the debt in order to revive, the courts there holding that part payment is not a "written admission of the debt."

It is also practically universal that a written acknowledgment of the debt, dated after it has been outlawed, will revive it and make it again legally collectible. Likewise a written promise of payment, dated after the statute of limitations has run.

Most courts hold, however, that the acknowledgment of an outlawed debt, to revive it, must be clear and unmistakable. It must without doubt refer to the particular debt in question. A few States, however, will construe almost any utterance by a debtor into a new promise to pay and will hold him in renewed responsibility. This, however, is not the general rule. The United States Supreme Court has really laid down the general rule, which has been adopted by the courts of most States. This rule is that the act or utterance of the debtor which is relied upon to make him responsible for another six years, must be an acknowledgment both of liability and willingness to pay. It has been held that if a man admits the outlawed debt, but says he can't pay it, it is not thereby revived. Neither is it revived when he admits he owes the claim and expresses hope that he may be able to pay. In most States a bare admission of the debt is not enough to revive it. The exceptions to this are Tennessee, Iowa, New Hampshire and New York. If it can be proven, however, that a debtor admitted unequivocally that "I owe that money," after the debt was outlawed, it is revived and he can be sued, because when he said "I owe it" he admitted liability and by inference expressed an intention to pay.

The principle on which any of the acts above described will revive an outlawed debt is that the admission, or the part payment, or the promise, is really a new promise or contract on which the creditor has a right to rely, irrespective of the original promise or contract.

I close with a point of law, knowledge of which has saved many a man large sums of money. It is that where a man owes another two debts, one outlawed and the other alive, and pays his creditor a sum of money which he does not specifically say is on account of either debt, the creditor may apply it to the debt, which by reason of being outlawed would otherwise be uncollectible. For instance, A holds two promissory notes signed by B for $100 each. One is dated January 1, 1901, the other January 1, 1905. Both are made payable in one year, and no action has been begun on either. On January 1, 1910, B hands A $100 without saying which note he means it to pay, A can himself apply it to the earlier note, which is outlawed and uncollectible, thus making both notes safe, for the later one can be sued on for two years yet. If, however, B had said when he tendered the $100, "this is to pay the note of January 1, 1905," A would have had no option but to apply it to that.

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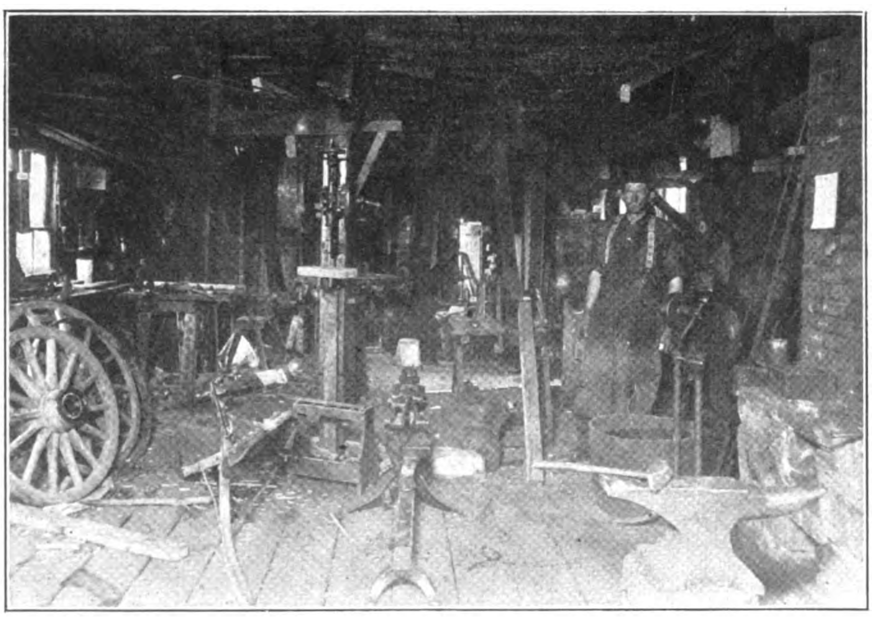


MR. MAY'S GENERAL SHOP IS EQUIPPED WITH POWER MACHINES, ENABLING HIM TO TURN OUT WORK QUICKLY

Opportunities

Here are listed a number of live opportunities for live blacksmiths—towns and localities where there are no blacksmiths and where blacksmiths are needed. If you want to start anew and if you have the necessary energy, skill and perseverance

to stick to business until business sticks to you, get into touch with these business chances. Write to the man or firm named under each address.

ALABAMA—at Bridgeton.
Address M. A. Farley.
ALASKA—at Hope.
Address Geo. Roll.
ALASKA—at Kodiak.
Address Alaska Commercial Co.
ALASKA—at Seldovia.
Address Postmaster.
ALASKA—at Cleary.
Address J. O. Wahlgren, P. M.
ALASKA—at Unalaska.
Address Alaska Commercial Co.
ALASKA—at Howkan.
Address W. E. Ross.
ALASKA—at Killisnoo.
Address Vincent Sabaleff
ARKANSAS—at Fancy Hill.
Address W. G. Waggoner.
CALIFORNIA—at Weitchpec.
Address E. L. Wright.
CALIFORNIA—at Lee.
Address Postmaster at Leeland.
CALIFORNIA—at Viola.
Address B. F. Louvins.
COLORADO—at Black Mountain.
Address H. L. Beeler.
COLORADO—at Cherry.
Address D. D. Gray.
IOWA—at Red Line.
Address E. C. Robert & Co, R. D., No. 1, Kierman, Iowa.
KENTUCKY—at Pulaski.
Address Postmaster.
MISSISSIPPI—at Clyde.
Address F. H. Campbell.
MISSISSIPPI—at Coldwater, R. D. No. 1.
Address M. A. McKinnon, Bowman, Miss.
MISSISSIPPI—at Bailey.
Address J. A. Bailey.
MISSISSIPPI—at Florala.
Address Postmaster.
OHIO—at Rempel,
Address Richards Bros.
OHIO—at Plumwood.
Address Postmaster at London.
OHIO—at Pattersonville.
Address Roy Best.
OHIO—at Plaza.
Address Postmaster.
OHIO—at Siam.
Address J. N. Hindel.
OHIO—at Speidel.
Address O. O. McWilliams.
OHIO—at Oneida.
Address J. M. Harsh, P. M.
OHIO—at Shawtown.
Address H. W. Butler.
OHIO—at Prentiss.
Address James Snyder, R. D., Leipsic
OHIO—at Omar.
Address Postmaster.
OHIO—at Pottersburg.
Address Edwards Bros.
OHIO—at Pride.
Address Postmaster.
OHIO—at Pearl.
Address F. R. Klein.
OHIO—at Rio Grande.
Address L. A. Allen.
OHIO—at Southworth.
Address Wm. Steiger.
OHIO—at Olive Furnace.
Address Postmaster.
OHIO—at Relief.
Address D. R. Greenlees.
OHIO—at Peerless.
Address H. L. Wells, Bloomfield.
OHIO—at Paradise Hill.
Address Postmaster.

"This man Turner seems to have sized up the evolutions of the craft pretty well" said Benton, looking up from the proofs of the current issue which he had been reading.

"Yes," agreed the Editor, "Turner knows what changes have taken place in the past ten years and he knows the craft pretty well. When I read his manuscript it brought to mind the stories my father used to tell about the old-time guilds in the old country. You know years and years ago there were no unions—that is, they didn't call them unions. The workingmen of each trade were members of what was called a guild. These guilds governed the actions of the men of the trade and also looked after the privileges of its members; saw that the government of the State gave its members proper consideration and that exemptions from tolls, taxes and other levies were maintained."

"Were these guilds made up of members who were journeymen, or the owners of shops?" questioned Benton.

"There were several kinds of guilds, those days," answered the Editor. "There were merchants' guilds, trade guilds and guilds for religious, social and other purposes. The merchants' guild, for example, was made up of members who were owners of butcher shops in the butchers' guild—owners of blacksmith shops in the smiths' guild, and so on. And these guilds usually had supervision over the journeymen and apprentices.

"These men—these merchants—were known as masters. To become a master, the candidate must first serve an apprenticeship of from three to four years, according to the trade in which he enlisted. The young fellow was apprenticed to some master who the governing body of the guild knew needed an apprentice and could teach the boy correctly. Under this master the boy worked, learned the trade and was taught how to use his brain as well as his tools."

"Did he receive wages of any kind?" questioned Benton.

"He was usually paid a small amount, yearly" continued the Editor. "At the end of the first year he was given a small sum of money and a new suit of clothes. The second year he received a little more, and so on; a small increase being made each year. At the end of his last year he was usually given his largest sum of money and a new set of tools for his trade. His master also gave him a book containing a certificate or statement of his apprenticeship; telling how long he had served and whether he had served well or not. His master usually appended a statement regarding the young man's character, his industry, and so on, And this book was always carried by the boy, now a journeyman, no matter where he went. It was called a 'Travel-book', and served the purpose of passport, letter of introduction, recommendations and many other purposes.

"The journeyman now sought the master of the guild, if he did not wish to work longer for his old master, and applied for a position with some other master. If there were a journeyman's position open in the same town, the place was offered to him. If a job was open in another town, the journeyman applied for it, taking his book with him to show his new employer,

"If he worked under this new master faithfully, or not, a statement to that effect was placed in the 'Travel-book.' Oftentimes a man would be seen frequently about the streets of a town, apparently with nothing to do. The police would then ask to examine his 'Travel-book', and if this was satisfactory in its statements the man was told to find work at his trade. If the book did not give the man a good character, or if he had no book at all, he was told to get out of town.

"When a journeyman wanted to become a master, he appeared before the guild in the town in which he wanted to start a business for himself and made known his desire. His 'Travel-book' was examined, carefully read and a consultation held. Then the journeyman was questioned on his knowledge, and if all had gone well he was instructed to execute what was called his 'master-work'—that is he had to perform a task that would demonstrate to the guild as well as to the town that he was a true master of his craft.

"I remember, especially, my father's description of a butcher's execution of his 'master-work.' The day set for the master-task was usually a holiday, or made one, and the townspeople were invited to view the candidate's work. The master-task for a butcher was to kill and dress a bull. This bull, a very fine specimen in this case, was decorated with colored paper roses and other flowers and then paraded about the streets of the town. Members of the guild and the candidate for the mastership followed to the village square. The candidate was arrayed in a new suit of white butcher's linen, and when the village square was reached he was given a new set of the tools of his trade and instructed to kill and dress the animal. The members of the town guild acted as judges and passed again upon his qualifications for master-butcher. If he did his task well he was licensed to operate a butcher shop in the town. If he did not pass this examination with credit he was not given the title of master-butcher, but was obliged to continue as a journeyman, until he again felt able to qualify."

"Well, that seems like an easy, yet very efficient, way to regulate the standard of a trade" agreed Benton. "There were few complications and misunderstandings regarding a man's ability; and disputes, when they did happen, I suppose were adjusted by the local guild?"

"Yes, the local guild was the governing body in all matters pertaining to the trade it represented," returned the Editor. "And there were similar methods and regulations to govern the other trades. The master-task for a blacksmith was probably to forge a certain piece from iron, while a shoemaker probably had to make a pair of shoes or boots.

"I sometimes think our grandfathers and great grandfathers did some things better than we do them." And the Editor turned to his desk to give his attention to some new proof.

Ol' Lew Grasty—Pessimist

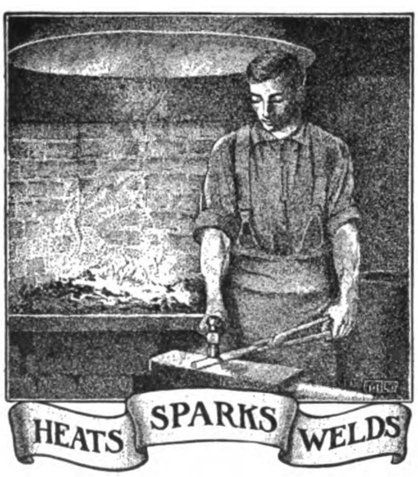
W. O. B.

It seems t' me it's mighty queer
Thet sum folks hes t' git a skeer
When things air doin'—er if they ain't—
Seems t' me they'd cuss a saint.
Take queer Lew Grasty— funny cuss,
Thur's nothin' so bad but it's goin' t' wuss;
Leastways thet's what ol'Grasty tells—
An' he sure kno's o' what he yells.

Lew sez he kno's thet what he sez
Is sure es de'th— he kno's it is.
He ses he has it right, or he
Wouldn't say a word t' me.
"I kno' "—he sez, "I hev it right,
I got my in-fer-ma-shun quite
Straite from—his name I cannot tell—
A high official, I kno' him well."

Now, 'cordin' t' Lew, we're on our way
T'—well—most anywhere an' decay.
The country's lost, it can't go 'long
The way it's goin', things 're all rong.
An' "business is in fearful straits"—
"Colossal failure for us waits."
"Disaster's comin' thick an' fast"—
"Things surely cannot longer last."

An' when Lew speaks an' whispers low
An' tells y' what'll happen so—
Y' marvel at his mind an' brain
An' at the things it must contain.
But what surprises me the most
Is thet the things y' hear him boast
Don't never happen, an' thet thay
Air mostly goin' 'long quite gay.



Hans Dillburger says: "Dere's many a cup between de lip an' de slip."

If a drill welder was a driller of wells would a well driller be a welder of drills?

Shops in all corners of the world are described and pictured in this issue. How does yours compare?

There are plenty of buffaloes in Buffalo. Ask for a supply, if your supply is low—we'll supply you quickly.

Do you believe in signs? A good sign over the door is a good sign of a good business coming through the door.

Most folks would accomplish more if they worked up a good perspiration while waiting for inspiration.

If you think it's hard to start results in an advertising campaign, just try to stop the results in your competitor's campaign.

Keep a box of sand handy in the engine room. It is excellent for extinguishing flaming oil, and it may save you money and prevent a dangerous fire.

There's no excuse for a shaky anvil-base. Set this important craft implement solidly on a good block and take more comfort in doing work that, at best, is difficult enough.

Some men, like Tom Tardy, are going to do most wonderful things,—in the future. They don't realize that they are making their future right now.

A record of shop work is always interesting; especially when comparing given weeks, months or years. Do you keep a record of your work?

Want a rubber stamp outfit, or a fountain pen? Get a new subscriber and ask for one or the other. If you can use both, send in two new subscribers.

Sure you've read the paper from cover to cover? Don't skip the ads. There are lots of good suggestions and hints in the ad pages, too.

If a smith with a five-hundred-dollar kit of tools puts thirteen cents' worth of brains into their use, what is his work worth? Is it worth—less?

Every job missed takes money out of your pocket. Of course you can't get all the work in your neighborhood, but are you getting all you might have if you went after it right?

Seems to work while you sleep, does competition. The live business man must be up and doing every minute of the business day, unless he wants competition to overtake him.

It doesn't pay—fair profits mean success, cut prices spell ruin. Common sense in business means common cents in profits. Again we emphasize—price-cutting doesn't pay.

What's your sideline? If you have the time to devote to one don't hesitate; and pick out a line that you know you can sell. Let demand rather than big profits decide the question as to what to handle.

When you advertise to do something, do that something as advertised. That gains confidence, and confidence gains business, and the more business, the more profit; and profit is your excuse for being in business.

Cheerfulness is a big trade winner. Just try the smile way of getting trade. See how much more successful it is than the gloom road. "No room for gloom" is a good trade-winning slogan.

Don't forget that the columns of The American Blacksmith belong to you. Write an item for publication whenever possible. Describe that shop-made machine, that difficult job, or your shop layout. Let us hear from you often.

Don't fear, the country's safe. Just give those dark grey walls a generous coat of whitewash, dig some of the smudge off the windows, and then see how much brighter the political outlook will be. Don't argue, try it.

Hand that new stunt over to your brother craftsmen—don't lock it up in your safe. Let it work for the good of the craft. Send it to the Editor for publication. Our columns are always open for the good things, the labor-saving stunts, the time-saving hints.

An active mind and a finger on the pulse of things, with other things equal, will keep you young when you are old in years. It's the fountain of youth for which countless knights of old spent time, fortune and life itself in seeking. Years alone are not an indication of age.

Lubricate the wheels of business with moderate applications of good humor. A smile and friendly handshake will gain more customers and trade than a frown and mumbled greeting. Try the smile tonic for more trade. A sunny smile lights the road to success.

Yes, we're devoting quite a little space these days to the question of costs and profits. But then, you know, it is a most important question. It really describes our reason for being in business. Hope you're not missing any of the good things being said.

What does the outside of your shop look like—a billboard? Put up a sign or two of your own—the neat, clean quality kind, but keep the tobacco, patent medicine and other signs off. The space is worth more to you than anything the advertisers can give you. Keep them off.

Sometimes there's a big advantage in having an implement agency. For example: when you cannot, with a clear conscience, recommend further repairs to a broken implement, explain tactfully that a new tool would be economy; and if you have the new tool in stock there's no reason why you shouldn't sell it. Incidentally, you'll make more profit than on the repair job. We say there's a big advantage in having an implement agency.

Ever think seriously about it? If you have, you will have come to the conclusion that it isn't work that kills men—it's play. All work and no play makes Jack a dull boy, and all play and no work adds a word of three letters to his name, Jack—. But lots of men don't know how to play. They think a barrel with a spigot in it is necessary to full enjoyment of playtime. Others think a bottle labeled "Rye" is a necessary toy. Then still others believe in as many different ways of fully enjoying the play period. If you don't know how to play, better learn. And when you choose your instructor see that he is of the proper kind and not of the spigot-barrel-and-rye-bottle brand. It's as important to choose your play partners properly as to choose an occupation. Don't let chance determine either.

"**Certain Naturalists** have ventured the opinion that horses do not need shoeing under any circumstances. This seems reasonable" says Harper's Weekly, "when we reflect that it is only within a few centuries that the practice of shoeing has been followed. But the horse was domesticated earlier than we can learn from history, and it is not likely that the roads were any less steep or free from stones than they are now. There are many countries in which horses and mules are driven over the hardest and steepest roads without ever wearing a shoe.

"It may be a question whether our method of setting the shoe is the very best in the world. The blacksmith takes the horse's foot in his lap and, holding it there by main strength, fits and nails the shoe. This always seems a tiresome operation for both beast and workman. The want of a common consciousness between the two renders the weight and the support unsteady.

"The same method is not pursued the world over. In Russia the smiths employ a method that is decidedly quaint. A line of seven or eight horses stands outside the shop, each with a leg strapped up to a post, in readiness there to be operated upon. Each horse is tied between four of these posts and each of these in rotation receives a single shoe."

Our Honor Roll

Lots of Room At the Top

There are still several years between 1923 and 1930 that are not represented on Our Honor Roll. Why don't you figure on one of these places for your name? The tail-enders are being crowded off,—you see we can't devote any more space to this list, and that makes it necessary to take names off from the end. So get well up in the lead and see how long you can stay there.

Does your account expire this month? Send a remittance of $5.00 (or $7.00, or 1£. 14s.) and place your name up in the 1922 class. You not only get your name up among the leaders, but you save money on your subscription account—to say nothing of the time and trouble you save by taking care of ten years' subscription at one time.

And then, too, don't forget our refund feature. It works somewhat on the order of life insurance, only instead of insurance on your life it's insurance on your subscription account. If you die before rceiving "Our Journal" for the full paid period, your widow or hair receives a refund equal to the difference between the period paid for and the period for which you read the paper. Isn't that fair? Better look over the long-time rates now and insure your subscription to "Our Journal."

	U. S. and Mexico	Canada	Other Countries
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s.

And then, too, you can gain a place on Our Honor Roll by getting new subscribers. Just show this big list of honor readers to your brother craftsmen. A paper must be pretty good to get a practical man's subscription years and years in advance. Then send in the new subscription orders and we will give you six months' credit on your own account for each new order you send us. That will help you toward an honor place. Will you tell your neighbor?

NAME	Subscription Paid to
W. C. Watt, Kan	Dec., 1930
I. J. Stites, N. J	Jan., 1928
W. R. Turner, Man	Oct., 1923
T. Bradley, N. S. Wales	Mar., 1923
W. Lawson, N. Z	Nov., 1922
A. Pfeiffer, Ohio	Aug., 1922
S. Smith, Tex	Apr., 1922
D. W. Smith, R. I	Mar., 1922
D. F. Kuster, Wash	Mar., 1922
R. H. Keith, Ia	Jan., 1922
O. M. Johnson, Minn	Oct., 1921
H. Feldus, Neb	Sept., 1921
W. K. Kline, Kan	May, 1921
R. S. Crisler, Ky	Jan., 1920
I. M. Townsend, Cal	Apr., 1919
C. Williams, W. Aus	Mar., 1919
T. P. Considine, Mass	Dec., 1918
Richard Brenner, Tex	Feb., 1918
W. F. Hill, N. C	Feb., 1918
P. J. Dally, W. Aus	Jan., 1918
J. Morrow, Pa	Jan., 1918
Mess Bros., Vict	Dec., 1917
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, N. Dak	Nov., 1917
W. C. Roney, Pa	Oct., 1917
J. N. Miles, Ky	Oct., 1917
H. Ferrel, Ill	Aug., 1917
J. McMeeken, N. Z	Aug., 1917
F. H. Gierke, S. Aus	Aug., 1917
A. R. Hallenbeck, N. Y	June, 1917
F. C. Bock, Neb	June, 1917
Yost & Halvorson, Minn	May, 1917
W. McCoy, Kan	May, 1917
A. Guettler, Tex	May, 1917
E. Thibaudeau, Wis	Apr., 1917
W. Pickering, S. Africa	Apr., 1917
Ed. Burrows, England	Apr., 1917
L. Kausch, Wis	Apr., 1917
J. M. Brown, Texas	Apr., 1917
J. C. Woods, W. Aus	Mar., 1917
C. Boulton, N. S. Wales	Mar., 1917
C. A. Hawkins, Ore	Mar., 1917
A. L. Monycott, W. Va	Mar., 1917
J. Peterson, Ia	Mar., 1917
J. Anderson, Tas	Mar., 1917
A. J. Neill, Vt	Mar., 1917
Ed. Deitrich, Ind	Mar., 1917
Lewis Chase, N. Y	Mar., 1917
E. O. Lee, S. Dak	Mar., 1917
S. Stemple, Ohio	Mar., 1917
R. S. Gugisberg, Kan	Mar., 1917
J. S. Haskell, Col	Mar., 1917
W. L. Roark, Tex	Mar., 1917
A. R. Barlow, Texas	Mar., 1917
C. A. Whitacre, Ohio	Mar., 1917
J. W. Haught, Ill	Feb., 1917

NAME	Subscription Paid to
Chas. F. Giese, N. Mex	Feb., 1917
M. E. Goller, Pa	Feb., 1917
J. Potthoff, Neb	Feb., 1917
G. M. Garety, Mich	Feb., 1917
Ernest Finley, Pa	Feb., 1917
A. Tillman, Cal	Feb., 1917
Walker Bros., N. Z	Feb., 1917
G. W. Whittington, W. Va	Feb., 1917
J. H. Hoyle, S. Africa	Feb., 1917
Irving Bros., N. Y	Feb., 1917
F. Roschy, Pa	Feb., 1917
August Millet, Ill	Feb., 1917
C. P. Robertson, S. Africa	Feb. 1917
G. A. Gurley, Ore	Jan., 1917
F. K. Wade, Me	Jan., 1917
L. V. Senn, Neb	Jan., 1917
S. H. Austin, N. Y	Jan., 1917
H. Kahl, Ia	Jan., 1917
J. H. Bergen, Kan	Jan., 1917
F. G. A. Williams, S. Aus	Jan., 1917
H. Grimm, Utah	Dec., 1916
A. H. Gooding, S. Aus	Dec., 1916
Leonard Smith, N. J	Dec., 1916
C. F. Shaw, Man	Dec., 1916
W. Elward, Pa	Dec., 1916
W. W. Egly, Pa	Dec., 1916
Jos. Boyer, Mich	Dec., 1916
J. Williams, N. S. Wales	Dec., 1916
J. H. W. Schneider, Cal	Dec., 1916
W. Sauer, Minn	Dec., 1916
F. F. Darling, Cal	Dec., 1916
Chas. Newland, Cal	Dec., 1916
J. T. Brahm, Ia	Dec., 1916
P. H. St. Louis, Wis	Dec., 1916
A. E. Nickols, Okla	Dec., 1916
C. J. Hall, Wash	Dec., 1916
Bob Fricke, Ala	Dec., 1916
Joeris Bros., Tex	Dec., 1916
R. Clemens, Conn	Dec., 1916
Scheffley & Schmitt, Pa	Dec., 1916
A. Brause, Ohio	Dec., 1916
J. E. Beatty, Mo	Dec., 1916
Geo. Cassie, Scotland	Dec., 1916
John Kain, Ky	Dec., 1916
F. W. Howell, Ill	Dec., 1916
Tom Nolan, S. Aus	Nov., 1916
H. J. French, N. Z	Nov., 1916
F. N. Browning & Son, Ky	Nov., 1916
J. Macuab, Scotland	Nov., 1916
P. Gessen, Ill	Nov., 1916
J. W. Gribble, S. Aus	Nov., 1916
W. G. Sim, N. Z	Nov., 1916
H. V. Ruehl, Ala	Nov., 1916
G. Lindborg, Ind	Nov., 1916
Pittman Stell, N. C	Nov., 1916
J. S. Finkenbiner, Ind	Nov., 1916

NAME	Subscription Paid to
R. D. Wixom, N. Y	Nov., 1916
E. A. Knapp, N. Z	Oct., 1916
T. J. Haskins, N. S. W	Oct., 1916
Lothian & Skinner, N. S. W.	Oct., 1916
W. B. Knouff, Ala	Oct., 1916
Gorham Bros., Ia	Oct., 1916
W. H. F. Brauch, N. C	Oct., 1916
Clark Olds & Co., Neb	Oct., 1916
Irwin Scott, N. Y	Oct., 1916
C. E. Durham, Kan	Oct., 1916
M. Ringo, S. Africa	Oct., 1916
W. Delley, Queens, Aus	Oct., 1916
J. J. Iler, N. S. Wales	Sept., 1916
James Poettgen & Co., Mo	Sept., 1916
Jno. Goettinger, Ia	Sept., 1916
Geo. Fleckenstein, Cal	Sept., 1916
Geo. Hill, Aus	Sept., 1916
E. C. Beard, Aus	Sept., 1916
J. K. Glinicki, Mich	Sept., 1916
Oscar Buhner, Md	Sept., 1916
A. J. Hammond, Cal	Sept., 1916
Robert Murray, Cal	Sept., 1916
D. E. Wright, Pa	Sept., 1916
J. S. Haskell, Col	Sept., 1916
R. Sommer, Aus	Sept., 1916
J. A. Sequin, Can	Aug., 1916
James Clarke, Jr., Aus	Aug., 1916
Dispatch Fdy. Ltd., N. Z	Aug., 1916
J. W. Fowler, N. Z	July, 1916
A. C. Lodwig, Cal	July, 1916
A. A. Bahlke, Mich	July, 1916
J. K. Hansen, Aus	July, 1916
J. B. Barker, Ill	July, 1916
H. M. Larsen, Wis	July, 1916
Geo. P. MacIntyre, Me	July, 1916
Jas. A. Buchner, Mich	July, 1916
H. M. Fingar, N. Y	July, 1916
L. H. Strange, Vict	July, 1916
P. O'Donnell, Vict	July, 1916
R. J. Hancock, N. Z	July, 1916
G. R. Harrison, Aus	June, 1916
J. Waycich, S. Africa	June, 1916
W. Voight, S. Africa	June, 1916
Martin Jensen, Wis	June, 1916
Chester Humbert, Wis	June, 1916
Lincoln Underhill, Cal	June, 1916
M. Broton, N. Dak	June, 1916
Hans Eriksen, Ill	June, 1916
C. Morrell, N. Brunswick	June, 1916
J. O. Conrad, Kan	June, 1916
Adam Schmitt, Mich	June, 1916
James Sinclair, W. Aus	May, 1916
H. Baker, Aus	May, 1916
E. Q. Krehbiel, Kan	May, 1916
C. H. Cairns, N. Y	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vt	May, 1916
C. A. Stebbins, Kan	May, 1916
Sanford Baker, Mo	May, 1916
P. A. Peterson, Ia	Apr., 1916
G. F. Bowers, Okla	Apr., 1916
D. E. McDonald, Fla	Apr., 1916
James Baxter, S. Africa	Apr., 1916
E. P. Dignan, S. Aus	Apr., 1916
W. H. Winget, Vt	Apr., 1916
C. Schmid, Neb	Mar., 1916
A. Rockenschup & Son, La	Mar., 1916
C. H. Alexander, N. Y	Mar., 1916
A. M. Harebo, Wis	Mar., 1916
George Howard, Kan	Mar., 1916
G. N. Follmar, Neb	Mar., 1916
W. Willoughby, Mich	Mar., 1916
H. Hoffmeyer, N. J	Mar., 1916
Frank L. Locke, N. Y	Mar., 1916
Frank L. Evarts, Conn	Mar., 1916
C. R. Winget, Vt	Mar., 1916
H. & J. Chisholm, N. Z	Mar., 1916
C. F. Molkenten, Aus	Mar., 1916
H. D. Phillips, S. Aus	Mar., 1916
J. B. Fry, Wash	Mar., 1916
L. A. Downing, Cal	Mar., 1916
A. A. Schreiber, Tex	Feb., 1916
J. T. Dillard, Tex	Feb., 1916
F. J. Flessel, N. Y	Feb., 1916
E. P. Jones, Kan	Feb., 1916
E. J. Bishop, N. Y	Feb., 1916
J. N. Tyler, Ohio	Feb., 1916
Chas. H. Kern, Ill	Jan., 1916
J. H. Ecroyd, Cal	Jan., 1916
Thomas Horne, Aris	Jan., 1916
Charles Tucker, Mich	Jan., 1916
M. Klitgord, N. Y	Jan., 1916
O. Stenning, S. Dak	Jan., 1916
Iver Johnson Arms and Cycle Works, Mass	Jan., 1916
Feldmeyer & Schaake, Kan	Jan., 1916
Chas. Winter, Cal	Dec., 1915
E. J. Bufe, Ia	Dec., 1915
Geo. Sykes, Aus	Dec., 1915
W. Patrick, N. Y	Dec., 1915
Jas. A. Sharp, Mass	Dec., 1915
J. Krahulec, Ill	Dec., 1915
P. E. Dahlfurst, Cal	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Neb	Dec., 1915
G. S. Fisher, Neb	Dec., 1915
Printers Supply Company, Neb	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Va	Dec., 1915
C. J. Ash, Kan	Dec., 1915
F. H. Joslin, Mass	Dec., 1915
C. W. Ames, Mass	Dec., 1915
C. L. Sorensen, Neb	Dec., 1915
E. Williams, N. Y	Dec., 1915
W. Urquhart, N. Z	Dec., 1915
W. Rupe, Kan	Dec., 1915

NAME	Subscription Paid to
L. S. Kocher, Ia	Dec., 1915
P. W. Frazer, N. Z	Dec., 1915
J. F. Shimanek, Md	Dec., 1915
J. P. Carrick, Ind	Nov., 1915
D. Codere, Ill	Nov., 1915
F. S. Woody, Ia	Nov., 1915
George H. Ilsley, Mass	Nov., 1915
M. I. Huff, Mo	Nov., 1915
Stephen Wachter, Pa	Nov., 1915
C. J. Willard, Ill	Nov., 1915
J. S. Lee, Wash	Nov., 1915
L. P. Mortensen, Mich	Nov., 1915
R. L. Whitfield, N. S. W	Nov., 1915
W. Foulkes, England	Oct., 1915
N. W. Hammond, Col	Oct., 1915
P. G. Dairdson, N. Dak	Oct., 1915
C. N. Mills, Cal	Oct., 1915
H. Dier, S. Aus	Oct., 1915
S. B. Goodsell, Conn	Oct., 1915
D. F. Hallowell, Ia	Oct., 1915
A. Roth, Ill	Oct., 1915
C. C. Perry, Aus	Oct., 1915
Sidney Stevens Imp. Co., U.	Oct., 1915
W. H. Findlay, N. Z	Oct., 1915
R. F. Watson, Cal	Oct., 1915
H. R. Stone, Conn	Oct., 1915
F. Teuber, Ga	Oct., 1915
S. W. Winch, Vt	Sept., 1915
Ed. Hammill, Cal	Sept., 1915
R. D. Simkins, Pa	Sept., 1915
T. J. Reynolds, Pa	Sept., 1915
Wm. Bates, Tex	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, W. Va	Sept., 1915
Hugh L. Lynn, Ky	Sept., 1915
Advance Blacksmith Co., Mo	Aug., 1915
A. Chargois, Queens'd, Aus	Aug., 1915
A. M. Byfield, W. Aus	Aug., 1915
C. E. Allen, Neb	Aug., 1915
M. J. Roder, Mont	Aug., 1915
J. E. Lyon, Tex	Aug., 1915
F. W. Krenz, Cal	Aug., 1915
J. W. Storment, Ill	Aug., 1915
Jos. P. Rotolinski, Mass	Aug., 1915
T. O. Chittenden, N. Z	July, 1915
The Goldfields Diamond Drilling Co., Aus	July, 1915
J. A. Lawton & Sons, S. Aus	July, 1915
W. C. Jones, N. C	July, 1915
J. Picotte, Yukon Ter	July, 1915
George M. Ferree, Ut	July, 1915
T. S. Finnigan, Vic., Aus	July, 1915
S. A. Stilles, Ohio	June, 1915
E. L. Herring, Fla	June, 1915
G. R. Twedell, Miss	June, 1915
H. P. Houghton, Ill	June, 1915
J. W. Ivie, Ut	June, 1915
A. B. Jardine & Co., Ont	June, 1915
L. Martin, Texas	June, 1915
John Payne, Col	June, 1915
M. J. Coughlin, Ill	June, 1915
J. K. Crawford, N. Z	June, 1915
F. W. Schlein, Ga	June, 1915
B. A. Parker, Ga	May, 1915
J. C. Klein, Miss	May, 1915
N. B. Demarret, N. J	May, 1915
E. E. Mercer, Kan	May, 1915
Schintgen & Maier, Minn	May, 1915
A. E. Spangberg, Ore	May, 1915
W. S. Helmecke, Tex	May, 1915
F. F. Putnam, Pa	May, 1915
Otto Siebler, Tex	May, 1915
W. A. Matson, Ut	May, 1915
R. Roberts, S. Africa	Apr., 1915
Otto Tietz, S. Africa	Apr., 1915
H. C. Adams, Ind	Apr., 1915
F. J. Eckert, Pa	Apr., 1915
A. Seewald, Ill	Apr., 1915
E. N. Harris, N. Y	Apr., 1915
W. L. Whitebread, Aus	Apr., 1915
I. P. Chiappa, Bermuda Is	Apr., 1915
C. Isaacs, Cal	Apr., 1915
P. Himes, Ore	Apr., 1915
D. E. Fish, Ore	Apr., 1915
W. M. McCurdy, Ore	Apr., 1915
C. Schmidt, S. Dak	Apr., 1915
R. E. Bethick, Pa	Apr., 1915
Otto Brandt, Tex	Apr., 1915
Morris & Gezek, Tex	Apr., 1915
C. M. Woodden, S. Dak	Apr., 1915
G. Gartner, N. J	Apr., 1915
John Reeff, N. Dak	Apr., 1915
J. D. Carrico, Ind	Apr., 1915
H. T. Rutter, Pa	Apr., 1915
W. M. Cummins, Pa	Apr., 1915
D. M. Kile, Okla	Apr., 1915
C. W. Brenell, Cal	Apr., 1915
Geo. Vandersee, Ore	Apr., 1915
H. H. Berry, Fla	Apr., 1915
G. E. Grotke, Ia	Apr., 1915
H. E. Weiss, Ia	Apr., 1915
H. A. Langworthy, N. Y	Apr., 1915
A. Waite, R. I	Apr., 1915
M. Scheese, Pa	Apr., 1915
H. S. Morris, Mo	Apr., 1915

Ten Questions For the Month

The questions this month will no doubt set the majority of "Our Folks" to thinking. Nevertheless, there is not one of the queries which every reader should not be able to answer. These ten questions do not, of course, cover all of the items along this particular line. The ones asked will, however, give you ideas and will suggest further investigations.

1.—Give a simple rule for measuring stock for a welded ring. Give an example using it.

2.—Give a rule for measuring stock for a ring of angle iron with the flange outside. Give an example using this rule.

3.—Give a rule for measuring the stock for an angle-iron ring with the flange on the inside.

4.—What is the rule for finding the length of stock required for oval chain links and similar shapes. Illustrate with example.

5.—What is the rule for calculating the length of round stock required to upset to a certain larger diameter of given length? Illustrate with example.

6.—Give the rule for finding the weight of forgings.

7.—What is the weight in pounds per cubic foot of cast iron and of steel?

8.—How much will a medium sized wagon tire expand when heated?

9.—Describe the circumferentor and its use.

10.—Describe an easy way of measuring the length of stock required for curves, scrolls and similar shapes.

Answers to Questions in June

1.—Heavy blows affect the entire section of stock, while light blows have a tendency to affect the surface only of heavy stock and to cause the surface or outside parts to slide over the interior.

2.—Uneven heating causes strains in steel.

3.—Steel that is allowed to "soak" in the fire loses its strength and structure, and the result is a brittle, crumbly metal.

4.—No.

5.—No.

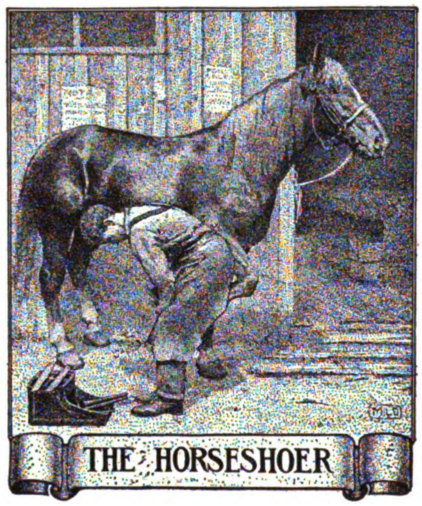
6.—A shallow fire allows the cold blast to strike the metal, thus causing oxidization, preventing proper heating, and causing strains in the metal.

7.—The steel is made very hard.

8.—This reheating relieves the strains in the steel which were caused by the working and heating of the metal.

9.—Parts that are to remain soft may be covered with fire clay, or if small ends they may be inserted in a raw potato. This will prevent their heating and consequent hardening.

10.—A warm bath is best.



Corns and Interfering

W. J. Meares

If a horse has a corn which is causing him to go slightly lame, but it is not suppurating, we put on a ¾ shoe which acts well and gives relief at once. If the bruised heel still shows any sign when due for shoeing we put on a ¾ shoe again. As a rule, after two shoeings, he is quite fit to shoe with an ordinary shoe. If a horse, however, has a suppurating corn, we pare it out till we get to the bottom to allow the pus to get a free exit, and then poultice the hoof, first of all putting a piece of gauze over the hoof and then a bran poultice, renewing in twelve hours. If bad, put the second one on twelve hours later. The gauze is to prevent the bran getting into the wound, as it may cause the sole to get under-run and cause considerable mischief. Another very good and clean way is to get a per chloride tabloid and dissolve in a pint of water and saturate some cotton wool and apply the wool to the sole of the foot. First place a piece of jaconet to keep it from drying and then place over it a square piece of sack. Tie this above the coronet, then bring the four points under the foot and tie together, to prevent the horse stamping the sacking through. It may be necessary to renew for two or three days, according to the case. Shoe with a bar shoe and leather pad, after packing the sole with Stockholm tar and wool. The horse will go sound. The shoe should be removed after it has been on a week and the packing renewed again, as dirt works into the foot sometimes in wet weather when the roads are muddy. After the horn has grown up again, in about six or eight weeks, shoe with a ¾ shoe. You will then have cured the corn. Of course the horse will be fit to work with the bar shoe quite well.

Another very annoying defect is brushing or interfering. I consider that my method acts better than the use of the feather-edge shoe. Supposing a horse is brushing himself on the near fore fetlock joint. Lower the outside wall of the foot and leave the inside high, using an ordinary shoe that will throw his fetlock joint upwards, so that the other hoof will pass it clear. If he strikes both, lower the will on the outside of both feet, leaving the inside wall high, and just put on a pair of ordinary shoes. Of course, if the hoof will not allow this to be done, the only thing then is to shoe with feather-edge shoes. The objection I have to these is that there are only two nails as a rule inside the shoe, and the others can be put on more securely and with quite as good results. I only said the fore feet, but it is mostly the hind feet that we find horses brush; especially when they get tired after doing a long journey. The same procedure applies to the hind feet as to the fore, although I find it easier to prevent behind than on the fore legs.

I have been at the trade since 1886, twelve years for myself, and since 1905 in the employment of the Government as Farrier Sergeant in the Natal (South African) Police.

We only have about seventy horses at headquarters at present. I have two men to teach shoeing, having already taught three.

An Aid to the Horseshoer

An Alabama man, says a daily newspaper, has invented the device shown in the accompanying engraving for assisting the shoer when operating on a horse's feet. The device consists of an apparatus that

straps on the back of the horse or mule and holds up the foot to be shod, thus saving the blacksmith the trouble of holding it between his knees and eliminating the possibility of the animal kicking the man through the wall when he gets restless. A saddle with a lever pivoted to it is strapped to the horse's back. Pivoted to the lever is a long bar that runs over the animal's back with the front end fastened to his collar. Over the rear end of the bar hangs a foot support with a band that is fastened around the horse's foot and holds it up at whatever height the blacksmith desires, also preventing the beast from kicking.

Training Horses For Shoeing and How to Make a Tuyere Iron

JOHN A. MUNRO

I think my plan of training horses for shoeing will be of interest to brother craftsmen. As soon as the horse's head is sufficiently handled place a halter on him. Then rope up one leg after another and each leg in turn and allow him to struggle as much as he likes with each leg so that he will know that his legs can be held in spite of him. You thus eliminate (if properly broken) nearly all the danger of shoeing the young horse and reduce the time formerly required for shoeing by one half.

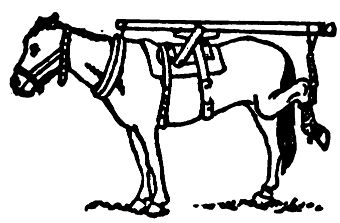
An Australian smith gave me the following tip on the making of a tuyere iron: A black pipe about three inches in diameter is slipped through the front of the forge onto the nose of the bellows, a slot about ½ by 1 inch being cut along the length of the pipe at whatever distance you want the blast. A piece of ½-inch iron with a corresponding hole, tapering smaller at the top, is bolted on to keep the pipe from burning, and a wooden plug is then put in the end of the pipe at front of the forge. You now have a blast from the bottom suitable for either light or heavy work. I followed the above instructions with satisfactory results.

Meeting Competition-3

A Series of Talks on Common-Sense Ways of Meeting Fair and Unfair Competition

By THORNTON

There have been several requests for a talk on catalog-house competition, and so I have promised to study the matter and if possible to give some pointers on competition of this kind. From actual experience I know very little about catalog-house competition. We come into touch but very seldom with the man who trades or is likely to trade with the catalog-house. But for the past few months I have been in correspondence with smiths who are forced to admit the



AN AID TO THE HORSESHOER

truth and existence of catalog-house competition. I have looked thoroughly into both sides of the matter and find the question so big that it may be necessary to divide my talk into two parts.

In the first place, catalog-house competition is divided into two classes. That competition in which the catalog-house is attempting to get the farmer and others to put in a smithshop equipment of their own—that is, encouraging your customers to do their own work. The other class of competition is that in which the catalog house sells the articles you should sell to the farmer, i e., wheels, whiffletrees, wagon standards, wagon gears and things of that kind.

Now let us understand right at the beginning that the business of the catalog-house is not unlawful as some seem to think. It is legitimate, and there is no reason why these concerns cannot do business in your county and town as well as every other county and town. Some of the smiths with whom I have been in correspondence seem to think that the catalog-houses are responsible for the high cost of living, the labor strikes, the crime waves and about everything and anything else on the calendar.

I am not defending the catalog-house—I am not trying to show them up as "saints" or trying to picture them as "pure white". But the feeling against them in some quarters has evidently caused some folks to see with warped vision and to tell some very big and evidently very wrong stories.

So let us start out with a correct idea. The catalog-house is legal as far as I can determine and is in business to stay. It has a most wonderful energy for continually seeking business—BUT there is not one thing about it, there is not one feature of its service, there is not one need, there is not one item of its smithshop competition that you as an up-to-date business smith cannot meet and compete with successfully.

Now, how is the smith to meet the arguments of the catalog-house?

Let us take up the matter of their campaigns to get the farmer to be his own blacksmith. Those of you interested in catalog-house competition are more or less familiar with their efforts along this line. You know their ads, reading: ""Be your own blacksmith", "Save money on your blacksmith work", and the like. And you have also seen the equipment these houses offer the farmer for a very small outlay. What arguments has the smith against the farmer doing his own work?

First and foremost is the fact that makes every trade and profession necessary, i. e., specialization makes man an expert. The smith specializes in smithing. He devotes his time and study to his particular branch of trade, and knows it as no other man does. He succeeds in doing difficult work for others and, naturally, knows how to do the work without experimenting a great deal. His familiarity with this particular work enables him to discard the wrong methods and to adopt the right, without first trying out one method after another and so spoiling or damaging the property of others. He is a specialist, just as the shoemaker is a specialist, and the doctor, the dentist, the painter, the carpenter and the plumber. If the catalog-house argument is correct, why not have the farmer act as his own dentist, doctor, plumber and shoemaker? If the catalog-house argument is right, why not have the dentist, doctor, plumber and shoemaker raise their own vegetables and other farm and orchard products? The smith is a specialist in smithing—the farmer in farming. Each doing his own work to the best of his ability and devoting his time and energy to his own business will give the smith better fruits and vegetables and the farmer better smith work.

And when it comes to horseshoeing, it seems to me there is no argument at all. As well do your own surgical

work as for the farmer to do his own horseshoeing.

The catalog-house advertising says: "Save time and money by doing your own repairing. Don't waste half a day going to the village smithshop—do your smith work at home, at a saving of money and no loss of time." The only argument the smith has against that is his reputation for doing work quickly and delivering it on time. Advertise that fact and back up the advertising by real performance. Systematize your business so that you can do work quickly and still do it right. Don't sacrifice quality for time, unless with the consent of your customer. Have an equipment that will enable you to turn out your work quickly, and let folks know you've got it and know how to use it. And a good way to let people know you are alive to their needs is to advertise the fact. Don't forget, you have the advantage every time. You know the people in your neighborhood; the catalog-house does not. You know what they need and want, individually; the catalog-house does business with a collection of people and not with individuals. You are in a position to suggest things to your customers, while the catalog-house cannot do so, because it cannot *see* their needs.

When you hear that some farmer in your neighborhood intends to put a smith shop on his farm, don't cuss and fuss about it behind the man's back. Don't tell his neighbors what you think of him. Go right over to the man's farm. Make a call and tell him just what you came for. And then tell him why you are in business; why you can do his work better; why it is to his best interests to send his work to you. And when you get started you'll have a great lot of

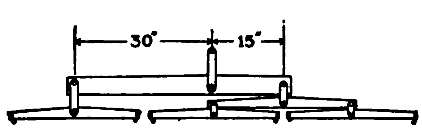


FIG. 1.—THE THREE-HORSE EVENER

arguments to hand him on the subject. Explain to him tactfully just where he is wrong. Don't get excited in your talk, but keep cool and a level head. Tell him how the best interests of the community demand co-operation, and that is what prompted you to call on him. If you do not convince him that he should not do his own work, don't snap "Good-day", but invite him to bring his difficult jobs to you. Tell him you'll be glad to have him bring in the jobs he finds too big or too complicated, and when he does come in treat him courteously.

There are really so many arguments that the smith can use that it is difficult to pick the best ones. The above will, however, give you some good ideas and set your mind to thinking along the right channels.

Arguments to reply to the catalog-house selling vehicle and other supplies will be taken up in my talk next month.

(*To be continued*)

How to Correctly Proportion the Three-Horse Evener

I. H. C. Service Bulletin

You will experience but little difficulty in dividing the load equally among the horses if you take into consideration the fact that the amount of work each horse does is in proportion to the lever arm or the portion of the doubletree given to him. In the case of three horses the third horse, or one which works singly, in order to do the same amount of work as the other two should be given twice the length of lever arm as the team. The length of the evener and also the length of the singletrees will depend upon the size of the horses and also whether you desire working them close together or somewhat spread out. For summer work the horses will stand the heat a little better if given plenty of room. This is advisable where conditions are such that more room can be given and at the same time not hinder accomplishing the work satisfactorily.

You will note in Illustration No. 1 that the third horse is given thirty inches of the lever arm, while the other two are given only fifteen. This distance is satisfactory for medium-sized horses. Where larger teams are to be used it should be increased accordingly.

Sometimes it is necessary in working young animals or light horses to give them an advantage. This can be done by increasing the length of the lever arm. There is no set rule for determining the amount of advantage to be given in the case of small horses. The most satisfactory way is to use a number of holes and simply shift the clevis until the small horse is able to carry the load the entire day without becoming more fatigued than the other horses. Some claim that the amount of lever arm or advantage given the small horse should be in proportion to the weight, but this is not always satisfactory because it is not taking into consideration the physical condition of the horses, which is a very important factor. However, to begin with, this method of adjustment does very well; other changes can be made as occasion requires.

Some Ancient Locks

Locks are by no means modern devices. The Greeks and Romans knew and understood the making and use of locks, and even the ancient Egyptians were acquainted with these devices. Naturally, of course, the locks and keys of the ancients did not approach the perfection of the locking devices of today; though the artistic effects shown by the locks

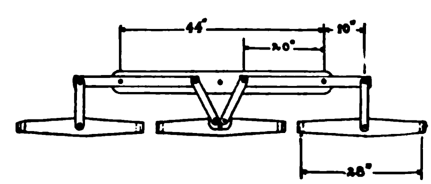


FIG. 2.—ANOTHER STYLE OF EVENER

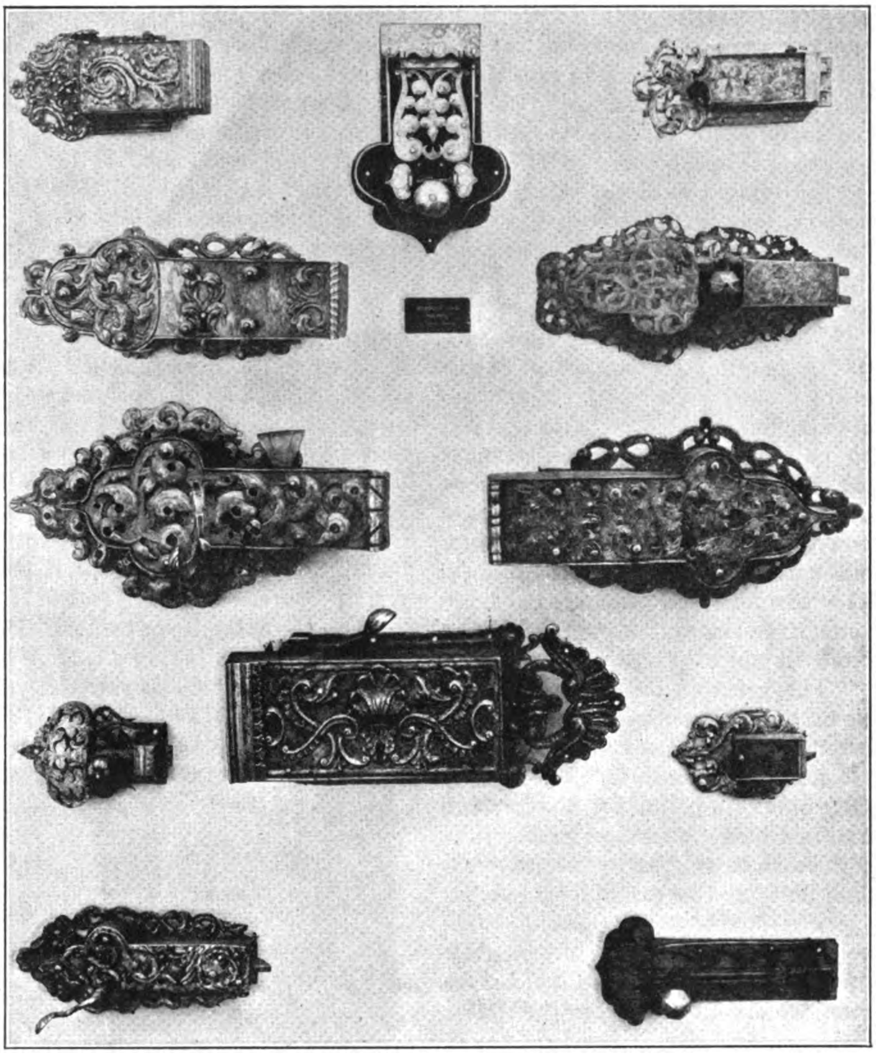
and keys of the earlier makers are far superior to those of today.

The old-time lockmaker was often very clever in inventing cunning and complicated lock mechanisms, and while, in many cases, the degree of security attained was not in accord with the trouble devoted to the device, they showed a considerable inventive ability. However, the amount

of ornamentation on the majority of the ancient locks leads one to believe that most of the locking devices were principally for ornamentation and incidentally for security.

The cunning of the ancient lock-maker was often demonstrated in very strange and intricate devices in his efforts toward security. He often planned and made puzzle locks which could be opened only by the initiated. Then, too, he often employed secret escutcheons, using, no doubt, a dummy key plate to baffle the unwelcome intruder.

The locks and lock cases shown in the engraving are of the Baroque and Rococo periods of the seventeenth and eighteenth centuries. Most of these pieces are very highly ornamented, and several styles of ornamentation are shown. For example, some of the cases—the second and third on the left and the third on the right—are ornamented by attaching the ornamentation with rivets to a solid plate, forming the face of the case. Other cases have an embossed appearance, while still another—the second on the right—has the appearance of having been etched. All of the pieces are excellent examples of the old time metal worker's art and show an exceptionally high degree of skill.



LOCKS ARE NOT A MODERN INVENTION—THE ANCIENTS MADE THEM IN NUMBERLESS ARTISTIC PATTERNS

The Farmer's Automobile

Some points about the motor car that have been discovered by a farmer user and which might well be considered by the automobile repairman and the blacksmith looking for a good sideline to sell to farmers.

"One year ago we bought an auto, and in the twelve months that have since elapsed we think we have learned something about them that might be worth dollars and cents to an intending purchaser," says a writer in a farm paper. "The car for country roads, as we have found, is not the heavy car. Neither is it the car of extreme lightness. The light car is hard to handle and is a rough rider. The farmer's car should be of weight enough to stay in the road and light enough to run without costing a fortune for gasoline. The medium weight car, costing from $1,250 to $1,600, is the car for the farmer.

"One week ago we were in a country of sandy roads. Here we found all the autos of light weight, being mostly runabouts or light touring cars. A light car is best for sandy roads, for in the sand there is not the 'throw' there is to hard roads, so here a light car rides easy, besides being the cheapest to operate. One owner of a 1,200 pound machine told us that his running average this summer had been 16 miles to a gallon of gasoline. This is a very good record for sandy roads. To run a heavy touring car in that country would have required almost twice as much gasoline.

"Our road expenses for the last year have averaged one gallon of gasoline for each 10 miles, while it takes about one gallon of lubricating oil for each 80 miles. This does not mean travel on good roads alone, but an average of good and bad together. Some men will tell you they can make 20 miles on a gallon of gasoline, but to do that the roads must be good and the machine must be in trim. Our car, when all tanks are full, weighs 2,100 pounds and carries 5 passengers.

"From talking with men who have owned cars for several years and from

our own experience we have come to the conclusion that each mile traveled will cost the owner of an auto from 7 to 8 cents, when first cost of car, repairs, oil and other expenses are taken into consideration. These figures are based on a car of moderate cost running on country roads without serious accidents. To the average owner we do not think they will be far out of the way.

"Is 8 cents a mile a high price for the farmer to pay for the use of an automobile? We do not think so. Remember, that price supposes you to be equipped with a 5-passenger car, and if you run it with but one or two passengers much of the time you will be different from us or any other car owner of our acquaintance. The farmer's car should be large enough to carry the family if the family is not too large.

"The greatest bill of expense, as we all know, is tires. We look for our inventors to find something within the next two years that will replace the rubber tire, but for the present we must have pneumatic rubber tires if we wish to ride easily and save repair bills on the machinery. A set of tires ought to run about 5,000 miles if well taken care of. A good thing to have is a small vulcanizer with which all scars on the outer casing can be fixed as fast as made. Inner tubes can also be nicely mended with the vulcanizer, thus saving many repair bills, for most garages charge 50 cents for each mend. Carry with you two or three blowout patches and an extra inner tube. With these you can soon repair any blowout without waiting for a patch to set.

We find our auto of the greatest use to us in the summer when it seems a positive shame to drive a team on the road. With the top up a trip to town becomes a pleasure instead of one of dust and discomfort both to yourself and team. If our horses could reason it would be hard to convince them that every farmer should not own an auto. Every farmer knows that to take a team off the farm to make a trip to town is harder by far than a hard day's work in the field. It is then that we say that 8 cents a mile is cheap for the use of an auto which is, in fact, almost railroad service at your door and on your own time.

"An auto is, of course, in most instances a pleasure machine. If any man can get his money returned from it, it is the farmer. More than any other man he gets real practical use out of it. If the ordinary farmer could get nothing from them but pleasure we would say, do not buy.

"Should we advise all farmers to get one? Of course not. No man should buy a machine who has not his farm paid for, machinery enough to carry it on well, comfortable furniture in the house and stock enough to balance the farm. When he has all these, then it is time to have an auto. And if you have all these blessings and wish to keep the boys with you, by all means get one.

"You who have automobiles can help those who have a notion of buying if you will tell what it costs you to operate your car and keep it in repair. Would you advise those who can afford it to buy a car? What is its practical value to you and your family?"

How to Treat Tool Steels for Various Purposes in Order to Secure Results

J. C. Scott

In *Tool Steel and Its Uses*

It is well known to anyone at all familiar with shop practice that to get the best results with any brand of tool-steel implies knowledge of the right way to treat it and care in treating it. When this involves, as is often the case, five or six different and distinct operations, there can be no fair test of the steel unless every one of these operations is properly conducted. However, in many cases it is a fact that because one or two of them are successful the test is considered a fair one and the steel is condemned because of failure in some other equally important operation.

Consider the case of a steel die. The different operations employed in making a die result in leaving strains which should be removed by subsequent treatment; however, in many cases the hardening process is expected to remove all of the strains and at the same time produce a fundamental change in the mechanical condition of the steel, and that, too, in a poor fire, subject to direct contact with the blast and with very careless handling. It is too much to ask of a piece of steel that it conform itself to half a dozen conflicting conditions at one time; yet if the unequal strains cause it to burst in cooling it is said that the fault must be in the steel. Printed instructions issued by many manufacturers are useless to the average machinist or blacksmith; first, because they imply the possession of an equipment which is beyond his reach; second, because they deal mainly and at great length with the necessities of their own product; thirdly, because while they tell him the object to be attained they do not tell him how to reach it.

What the machinist needs is a few simple, practical rules that can be applied to any make or kind of bath-hardening steel and can be carried out in any ordinary shop.

Forging Dies

As an illustration, we will take the matter of forging dies: In the first place, the material is forged to the shape wanted, which results in what are designated by the mill as "hammer strains."

In the second place, to facilitate the machining of this material readily, it is annealed, putting in what are commonly called "annealing strains," for the reason that the different pieces vary materially in thickness, and consequently the average annealing does not affect the steel uniformly —the more so because the hammer strains interfere to some extent with getting the piece entirely ductile.

In the third place, the operator will proceed to machine this die, generally taking a small amount off the ends, sides and bottom, but sinking in the face of same, possibly

a very deep and intricate shape, for the purpose of forming a drop forging. This, it can be readily seen, causes what are called "mechanical" or "machining" strains.

Ordinarily this die is now considered finished and is put into the furnace and brought up to what is considered by the operator the proper heat for tempering, with the result that two out of five of the dies will burst in consequence of the conflicting strains above mentioned.

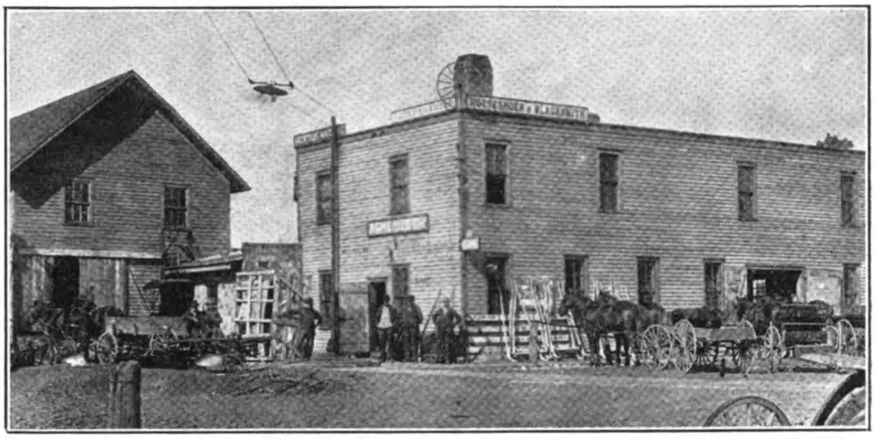
To prevent this, as soon as the die is machined it should be heated up to a fair cherry red throughout and laid in a dry place to cool. This operation will relieve all the strains which have been put in either in forging, annealing or machining, and the operator will find that the die then will take the heat more readily and more uniformly and will harden much more successfully, there being scarcely any risk whatever of its bursting, cracking or chipping off in his hands, if carefully handled.

After the operator has thus relieved the strains, the hardening process should be as follows: Heat the die to a fair red throughout, being careful that the corners have not been heated up too rapidly and that the heat has penetrated to the center. The die should be left in the fire until it assumes a uniform color which is known as the critical point, at which period it should be put into the water on tongs and kept immersed and moving until the operator feels—as old workmen say—that the steel "has just quit fussing." He should have some oil ready at this time so that he can immediately remove the die from the water and finish the cooling in oil.

If these directions are followed carefully, there is no reason why the operator should burst a die in a lifetime. The one vital essential in hardening is to know when the critical period is reached.

Trimming Dies

The foregoing paragraphs on handling die-blocks are applicable to dies for hot work, generally averaging from .60 to .70 carbon and, if the operator uses a pyrometer, the heat should be from 1350 degrees F. to 1450 degrees F. For trimming and stamping dies the steel will be of a higher carbon, for the reason that it will be necessary to have a harder and firmer edge that will stand up on the cold work. The steel generally



MR. JOHN E. MALMBERG, OF VIRGINIA, RUNS A GENERAL SHOP, HANDLES FARM IMPLEMENTS, AUTO SUPPLIES AND DOES AUTO REPAIRING

furnished is from 1.10 to 1.20 carbon and should not be heated above 1350 degrees F., which is a dark red. In the hardening the same treatment applies as to dies for hot work.

Taps and Reamers

For taps, reamers and cutting tools generally the steel should be not less than 1.20 to 1.30 carbon, heated at about 1350 degrees F. and the temper drawn to 425 or 450 degrees F. in oil.

For tools for turning or cutting hard chilled rolls or extremely hard material, the carbon is increased proportionally up to 1.65 carbon for the hardest. The extremely high carbon steels, while they carry a greater degree of hardness, are more easily ruined in the heating than the lower carbons, although when handled properly they will give better results.

Good vs. Poor Steel

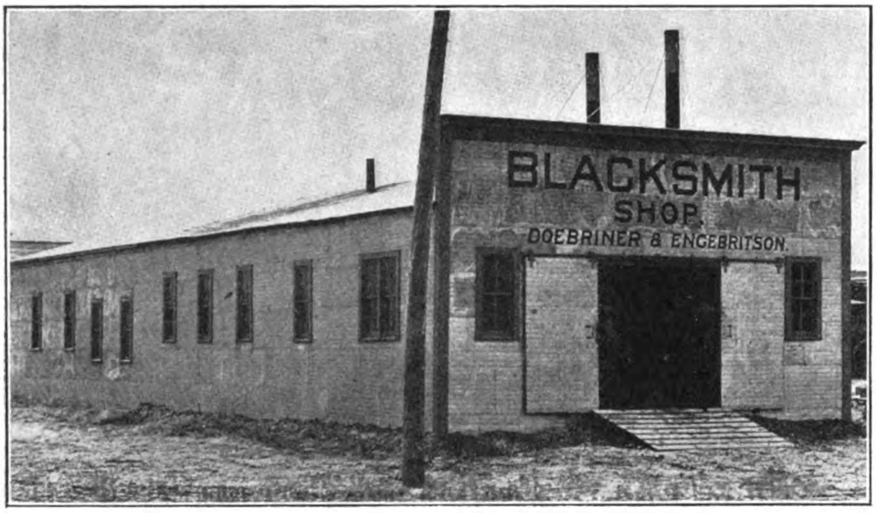
The operator will please note that the only difference between a poor steel and a good steel is the strength in one more than in the other to carry up the hardness, whether same is artificial or normal.

To illustrate what we mean by this, note that 212 degrees F. boils water; 375 degrees F. ordinarily relieves the steel from all strain; 425 degrees F. is commonly called a straw color; 450 degrees F. a copper color; and 550 degrees F. indicates the lowest temper at which it ordinarily is possible to leave any noticeable degree of artificial hardness. This is designated as a spring or flash temper. It is called a flash temper for the reason that, if you are drawing the temper of tools in oil, by the time you get up to 550 degrees F., both the oil in which you are drawing and the article to be drawn are at so high a heat that almost immediately after the article is taken from the oil, thoroughly drawn, the surplus oil on the surface evaporates or dries up.

Now you will readily see from the above that if you buy a cheap steel and are therefore compelled to draw the temper down to the lowest point at which you leave any of its artificial hardness in order to enable the tool to do the work without chipping or crumbling, the result will be that the amount of work you can turn out with this tool will be reduced very materially. On the other hand, if you have a better steel, made out of better stock, and by people who thoroughly understand the making of a first-class carbon steel, this steel after being made into a tool can simply be drawn just beyond the point that naturally takes the strain off, leaving the greatest possible degree of hardness that can be put into it.

The Best Is Cheapest

This grade of steel will not only stand up longer than a cheaper grade, but will do so much more work per hour that it will pay both for the difference in the price of the two steels and the cost of making the best tool. Thus you will readily see that it would be false economy to have the cheap tool-steel at any price; not only for the reason above stated, but also from the fact that it costs you just as much time, trouble and expense to make a tool out of poor steel as it would out of a first-class article. Where the operator has not the oil handy to use to handle the steel as above, he of course can use the different colors as above mentioned to draw to.



THIS SUBSTANTIAL LOOKING SHOP OF NORTH DAKOTA IS RUN BY MESSRS. DOEBRINER AND ENGEBRITSON

Changing Brands

We quite often hear it said by purchasing agents, superintendents and blacksmiths—and it does not make much difference whether they are getting good, bad or indifferent results in their work—that they do not care to change steel for the reason that they are more thoroughly acquainted with the steel they are using. We believe that a man ought to be contented, but, as there have been so many improvements—not only in steel, but in the uses of steel—we do not believe that he ought to be satisfied. He should always strive to get the best possible results, for results are what the manufacturers, who have to consider not only superintendents, but other men employed, are after.

This notion of the advantage of sticking to the same brand because you are familiar with it is greatly exaggerated. As an illustration of this, let us take the common assertion that you must know the carbon of a piece of steel in order to get results.

It is not necessary for the operator to know anything about what carbon is in a piece of steel to get good results. This may seem a strange assertion to make and will not be believed by a great many; but if the operator will simply try the following directions we believe he will in future admit that he can handle any piece of steel of the carbon quality, regardless of whether it has .60 carbon or 1.60 carbon, whether the grade of steel is new to him or not.

THE PLOWING SEASON IS A BUSY ONE FOR MR. I. W. MEMHARDT OF NORTH DAKOTA. HE HAS A WELL-EQUIPPED POWER SHOP

Three Important Points

In the first place he must distinctly understand the decalescent, critical, and the recalescent points. To explain what we mean by this: Steel, whether .60 carbon or 1.60 carbon, if handled carefully can be safely heated to a dark cherry red throughout and, while we do not believe in roasting steel, we believe in giving it ample time to come up to that point without forcing. Then, if the operator will pay strict attention and increase his heat a trifle as the heat reaches a certain point, he will notice that the steel is apparently cooled off. He is liable to think that possibly the air is striking it, but the phenomenon is really caused by the fact that thus far the heat has been penetrating slowly through the outsides of the article, and at this point—known as the "decalescent point"—it has struck in toward the center, leaving the outside heated in spots or uneven.

This is caused by the difference of density in the steel and from other causes and should be watched very carefully until the article to be hardened assumes the same color throughout, which should be not over 1450 degrees F. for the mild steel and from 1300 to 1350 degrees F. for the highest carbon steel. The point at which the steel thus returns to uniform heat is the "critical point" and, if the steel is not immediately quenched, it will reach the recalescent point and will soon begin to oxidize or "burn," and be ruined for all practical purposes.

As carbon steels of exactly the same carbon will vary 50 to 100 degrees F. in the heat at which they should be hardened to get the fine flint-like grain that gives the best possible results, the watchfulness and skill of the man in charge of the steel at the critical period are of the greatest importance.

Even though you have a pyrometer on the furnace, it is not safe to rely upon it for the heat will always be greater than shown by the instrument. One reason for this is the fact that the temperature increases in the steel at the rate of three to one after the striking in of heat, or decalescent stage. Another reason is that the steel is generally heated more rapidly than the furnace lining, owing to its being in

position to absorb not only the direct heat of the fire, but the reflection from the walls.

Secrets of Successful Hardening

The only sure way to get results, therefore, is as follows:

First: Handle the steel carefully and give it time to come to a dark cherry red without forcing.

Second: Increase the heat slightly and watch for the appearance of the decalescent stage.

Third: Quench immediately after the steel has reached the critical point, and before the recalescent period is reached.

To get the best results, steel must always be hardened on what is called an "up heat", instead of being overheated and then held in the air until the operator thinks it is time to quench it. It is much better, having overheated the steel, to lay it down, allow it to cool considerably below the point at which it will harden and then bring the heat up to the proper point again. This will not do the work as well as if it had been handled right in the first place, but will give much better results than to quench in water when the heat of the steel is going down.

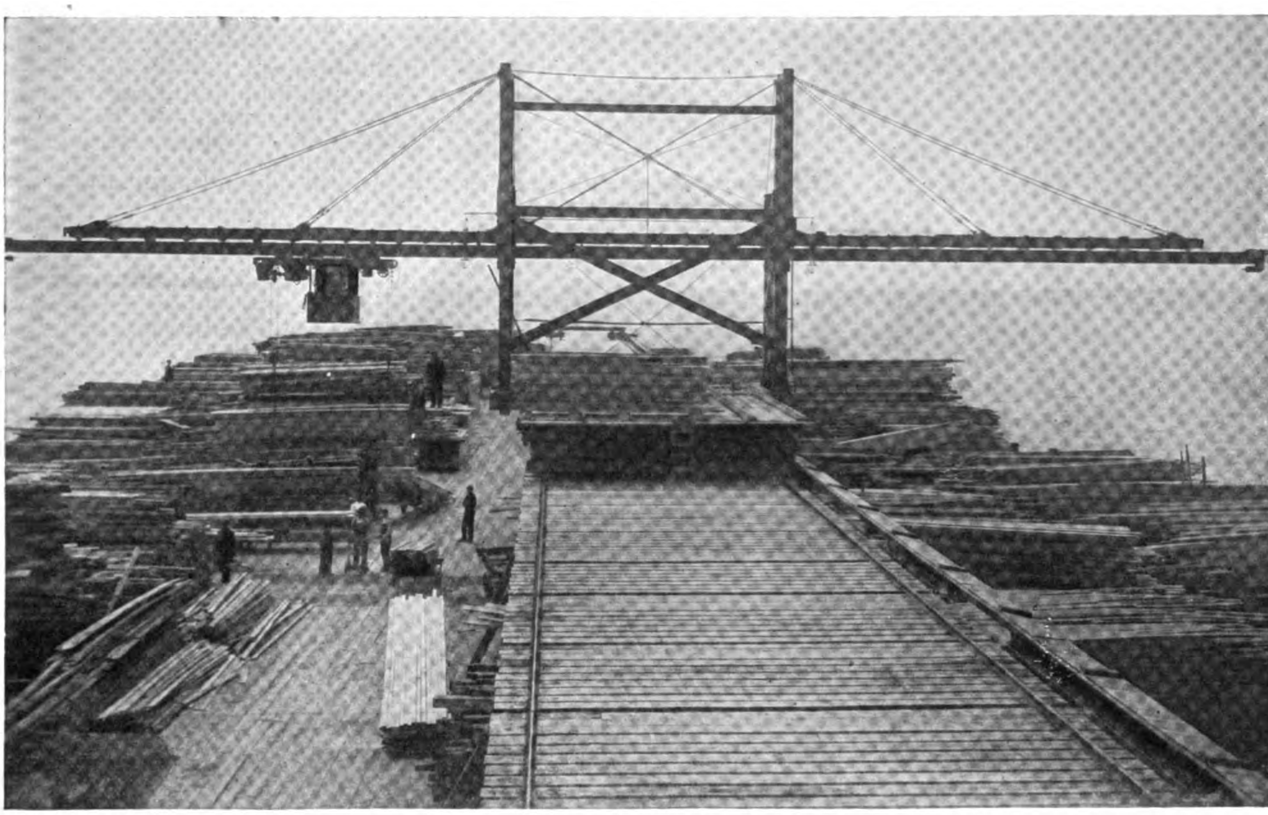
Overheating Results

If tested after hardening with a file—assuming that both have been drawn to the same point to toughen or temper—there will be no noticeable difference as to the hardness between a piece hardened properly and one that has been overheated; in fact, one would be inclined to think that that piece which had passed the last point of the danger point, was the harder. If tested with a scleroscope, however, which is the only way to determine the beneficial hardness, you will find that the properly hardened piece will possibly go from 80 to 105 hard, depending on the amount of carbon, while the piece which has been a trifle overheated, or gone past the critical point, will not be over 70 hard for high carbon and less for low carbon. While to all appearance, if tested with a file as stated above, it would be hard enough to withstand any use that it could be put to, the steel has a granular, open appearance, will crumble, and is almost devoid of strength, for the simple reason that it was ruined in the hardening. After this has been done, no amount of drawing the temper or letting down of the hardness would bring the quality back. When a piece of steel or die block has been overheated, its usefulness has been impaired just in proportion to the amount of abuse it has received; and if much overheated it is no better than a piece of slag.

High vs. Low Carbon Steels

High carbon steels when hardened acquire properties diametrically opposed to those found in low carbon steels. Both may harden equally high under favorable conditions, but, assuming that both are equally hard in the sections actually hardened outright, the strength increases with the increase of carbon up to about 1.65. The strength of the partially hardened sections, as the inside of large dies, etc., decreases with the decrease of carbon; the maximum carbon generally used in forging dies being approximately .60 to .70. All carbon steels lose about 50% of their strength when overheated.

Steel containing less than .40 carbon will fail to harden, and is classed as machinery steel. With .60 carbon it will harden sufficiently for all dies for hot work and work similar to hot work. It is advisable, however, to increase the carbon at



THE MODERN LUMBER YARD IS QUITE DIFFERENT FROM THE OLD STYLE YARD. THE ELECTRIC CRANE HANDLES IMMENSE QUANTITIES OF WOOD QUICKLY AND ECONOMICALLY

least five points to make allowance for loss in heating and annealing.

Carbon steels, having originally barely enough carbon to harden under favorable conditions, will lose enough carbon in treatment to make them fail to harden at all, or to harden in spots. Therefore, if a uniform and clean hardening is desired on a finished surface, there must either be enough carbon in the steel to make up for the loss in heating, or it must be packed and heated in a casehardening box, which adds to rather than subtracts from the carbon on the surface. If a casehardening box is used. the article to be hardened should be packed in a mixture of three fifths charcoal and two fifths crushed bone,

Brief Hints for the Practical Steel Worker

Always take pains to have a good body of fire, whether you are heating steel for forging, tempering or hardening, and heat steel slowly, especially large pieces.

Protect the steel as much as possible from contact with the atmosphere and do not allow the blast from the tuyere to strike upon the hot steel.

Pieces that have holes drilled partly through them should be put into the bath with the hole uppermost, so that the steam may escape and not remain to prevent hardening of the inner surface. In the case of mills, reamers, taps and other pieces having deep grooves they should be kept in motion in the bath for the same reason.

In forging Scott's Tool Steels the heavy forging should be done at the higher temperatures and the finishing at the lower.

No brief instructions for tempering can be safely given. Temper should be drawn to suit the work.

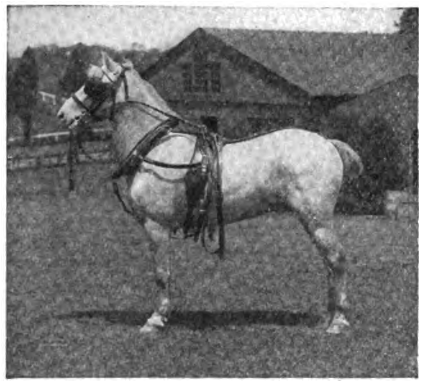
Don't order steel without stating purpose for which it is to be used.

Temper means percentage of carbon; quality means absence of impurities.

The most important single direction for treating steel is this:

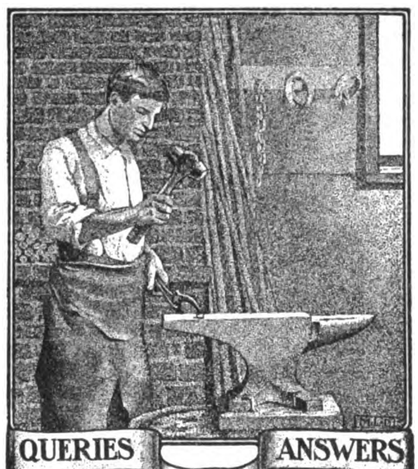
Always harden at the lowest possible heat for hardness required.

The enormous number of expensive tools that are ruined in hardening makes it well worth while for the mechanic to observe this caution. It is given in practically every book on the subject. There are, however, few books or treatises that enable him to tell when the proper point has been reached, inasmuch as in most cases he has no gauge of temperature but his eye. Furthermore, after annealing, it is impossible to tell anything about the carbon constituent.



A CHAMPION HACKNEY PONY

The mechanic, therefore, needs some way of determining readily when the steel reaches this critical point. With a good body of fire and careful attention it is not a difficult proposition.



Information on Plow-Work.—I would like to see more information on straightening plow beams, the proper measurements, etc. M. A. Dorothy, North Dakota.

On Spring Tempering.—Will some brother smith enlighten me as to the best way to retemper spiral trolley springs which have gone dead? D. B. Dick, Idaho.

Wants Shoe Machinery.—I would like to know something about shoemaking machines. Could anybody make shoes with a trip hammer? If so, I would like a drawing of the tools that are used.

O. R. Fairbrother, New Zealand.

A Trio of Questions.—Will some brother craftsman send a drawing of a sinking tire platform? I want one ready for next summer to do all sizes of tires from one to six inches. Also how to take off rubber tires, as they are coming into use here. Also an anvil tool for welding the tires in.

John H. Tucker, Australia.

Hardening Springs.—A recent article in The American Blacksmith on springmaking mentioned that all the plates were hardened in oil. I am a springmaker in the workshops of the Victorian State Railways, and all of our plates, both large and small (flat work), are hardened in water, but all spiral work is hardened in oil.

S. Whitford, Australia.

Favors the Cold Way.—I have read a great deal about cold tire setting. Some of the brother craftsmen indorse it, some think it is fair, while others say it is no good at all. I have been in the business for fifteen years, have worked in different shops on different cold tire setters. I purchased a Scientific. I have used it for four years now, and often wonder how I ever got along without it. I set all kinds of tires—light feather-edge tire as well as heavy ones. Regarding wedging spokes and repairing wheels, I put the tire back on the wheel in its usual place, put it in the machine and set it in less time than you could whittle enough shavings to build a fire to get it hot enough to shrink the old way. H. E. Myers, Kansas.

A New Zealand Shop.—I have a blacksmith shop with two fires, but only keep one going. Have been running it only nineteen months and turning over from £44 to £60 ($214 to $300) a month. My main work is shoeing. I make all my own shoes, as I like them better than factory ones. I can't get the nails up high enough in the factory shoes without a lot of work. I also do the iron work for a wheelwright across the way.

This is the center of a large dairying district with five large cheese factories and many smaller ones. It is located fifty miles from the nearest port of Wellington. There are four blacksmiths in Carterton. The man who owns the shop has a motor garage next door. He is the agent for the Ford cars and doing well with them.

O. R. Fairbrother, New Zealand.

Jobbing House Competition.—I have been a reader of The American Blacksmith for a number of years and enjoy the discussions therein very much, although as a rule in the end we are just as much in the dark as before.

I believe that one of our greatest competitors is the jobbing house. The salesman comes in and diplomatically secures your order. Then he proceeds to the hardware store and sells the same goods a little bit cheaper. If you discuss the matter with him he at first denies the charge, but finally will admit that he has to do this to compete with the cheap hardware houses who sell only to the hardware house. There are, however, few cheap hardware houses that will sell to the blacksmith, and if they do you pay a profit to the local hardware company. Blacksmiths can form unions and set prices, but still competition is great.

Crank, Kansas.

On the Tempering of Springs.—I would appreciate information on the tempering of motor springs. I have no trouble in welding them, but simply in tempering. I forge them and then hammer them up until

I get them all right. After this my trouble begins. I have nothing but the open fire to heat them to do the hardening part and I find it very difficult to get an even, regular heat all over if a spring is long. When I place it in the water to harden I put it in as straight as I can, but I find that the cooling has altered the set of it. I then put oil on it and draw it back in the fire until the oil blazes and hammer it up again. I have tried drawing it back with a small cedar stick until it starts to spark, but it does not matter how I do it I am never satisfied with the result. I have had them break when I rehammered them, although they were that warm you could not hold them, and you would see the flaw that we term water-cracks. As I want to be up to date I wish you would tell me what kind of oil I should use for hardening.

C. STEVENSON, Australia.

A Letter From Ireland.—I do all kinds of smith work, but as there is a decreasing demand for horseshoeing, etc., in this part of Ireland, I am interested in the question of installing power, that is a suction gas engine, lathe, power hammer, etc. I already have an installation of sawing machinery.

I would like to see more information on the making of springs for vehicles, as also axles, as there is a good sale for this class of work in Dublin, Cork, etc. As you may not understand the meaning of chuttles I would explain that this is the part connecting the springs of the vehicles to the body.

Kiltannon is a gentleman's residence situated within a mile of Tulla in about the center of the County Clare, Ireland. Limerick is the nearest town of any note to this place, seventeen miles away.

THE AMERICAN BLACKSMITH is a very good paper There is nothing that I have ever read that I like better; everything is so suitable to my ideas. I also find The American Steel Worker a fine book.

THOMAS O'HALLORAN, Ireland.

From Far South Africa.—This district is a very dry one and the farmers here are mostly raisers of ostriches. They grow grain as well, but generally give land to natives on shares. It is a black man's district, the population being on an average twenty natives to one white person. We have to travel thirty-six miles by ox-wagon over rough and hilly roads to get to the nearest railway station.

I am by trade a carriage and wagon smith and farrier. I came to this district in 1903 and since then have been doing jobbing and horse shoeing. There is also plenty of plow work, such as laying shares and making harrows and landsides, etc.

I own my own place, eleven morgan (about 7 acres) in extent, with shop and house. I keep ostriches for breeding only, and cattle, and also do a good business in buying and selling cattle on speculation. My shop consists of one forge, one drilling machine, one spoke and boring machine and a tire bender. I have one helper. Most people in this district are poor payers; thinking nothing of making me wait nine months for payments.

F. LEIH, South Africa.

Several Questions On Several Topics.—I am especially interested in the subject of automobiles, as my business is daily increasing in the motor line and I am always seeking the latest, most convenient way of handling the cars. I am much interested in the oxy-acetylene, also the oil welding methods, and have read your articles on both systems, but as I would like to install similar methods in my own factory would like more explicit explanations.

What do you consider the most convenient method to adopt for getting at the bottom portions of the machinery of a motor car? Some use a pit, but I would like to hear of some other more simple and convenient method.

We have some motor car channels to shrink up for large pneumatic tires. Our country is very hot and motor car wheels become rim-bound, and we find it a very awkward job to shrink or make the channels smaller. Do you know of any simple way of making them smaller, and are there any special tools to do the work? Furthermore, how are motor car tires channel welded by firms who do that class of work? Also describe and sketch special tools if any, for that sort of work. Do you think the channels could be welded with oxy-acetylene method? J. DONNELLAN, Australia.

Hot and Cold Shrinking.—I have been reading some of the arguments in THE AMERICAN BLACKMITH about cold and hot tire setting and thought I would get in the argument also. Of course, every smith has his idea about setting tires. I set my tires with a Scientific cold tire setter and I think it is the best way because a man can get his tire just as tight as he wants it and give it as much dish as he wants.

Now hot setting may be all right if a man is setting tires hot every day so he can get to be a good guesser, but out in this country we only set tires for a few months through the hot weather. I have tried to set a few by the hot method and to guess how much shrink to give them, but I am a very poor guesser on anything like that and I generally make two guesses before I get them right.

I think every tire ought to be taken off the wheel whether it is going to be set hot or cold so as to look at the end of the spokes. If they are flush with the outside of the rim, cut them off with an auger bit about $\frac{1}{16}$ or $\frac{1}{8}$ of an inch shorter than the outside of the rim and if the tenons are worn wedge them. I cannot set a tire and make it tight if the end of the spokes are outside of the rim $\frac{1}{16}$ of an inch although I have seen it done, or rather tried, but the result was a kink in the tire between the end of the spokes.

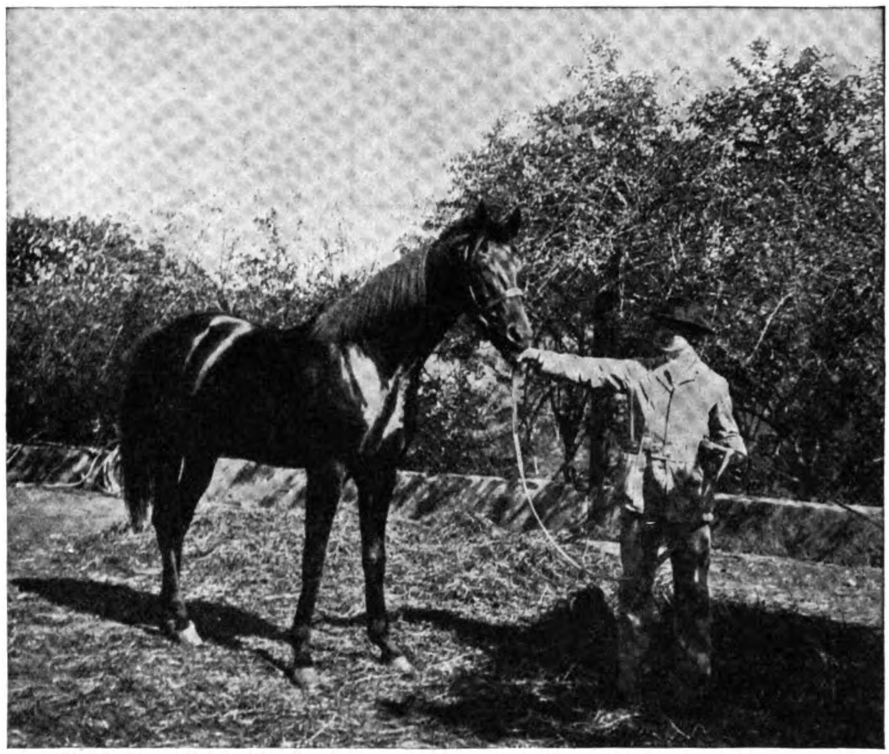
J. V. JOHNSON, Ohio.

An Interesting Queensland Letter.—Starting to work for my father who was a millwright and machinist I have worked at the wheelwrighting trade, learned railway surveying and gold mining, etc. For the past five years I have devoted my time to inventions which have proved successful on my farm; among them being a cotton picker, locking device for nuts, etc.

For the past three years I have had the pleasure of reading your paper and consider it the best and most instructive craft paper that I have ever seen, and my reading extends to eleven papers and I see most that reach this State.

At the present time the blacksmithing kinks interest me most; the cold tire setting is interesting. Compression of iron into molds is in my opinion the coming way of making most work, and I should like all the information possible on the method of doing it. The shoeing articles are also very good, as are the methods of welding and the articles by Bert Hillyer and J. F. Sallows.

The class of work needed to be done here, owing to the different climate, is wholly different to yours. Very much of the wheelwrighting is done with American ready-made hickory, that is the lighter work, but all the heavy work is made of Australian hardwood and is very durable. Hundreds of shops here consist of only a bellows, anvil, vise and drill. A few upsetting machines are being introduced and small hand drills. The ordinary smith has no power. We have large engineering shops that do heavy smith work, but with the exception of the steam hammer have few if any power tools, resulting in expensive local made machinery. Nearly all classes of labor are now combined, but for want of combination among the employers and producers they are having their own way. This will cripple primary industries until they realize the necessity of uniting. ARTHUR JONES, Australia.



THE THOROUGBRED STALLION "SCOTCH DEMON"—A FINE APPEARING ANIMAL WITH EXCELLENT LINES

They are the first and only rustless screw calks—the threads can't rust into the shoes.

Ring-Points are different outside as well as inside from all other calks, and this calk above all others is the one for horseshoers to use to hold their trade.

Remember—your jobber is buying his calks now for next winter. If you want Rowe Calks for your protection you must tell your jobber so now. If you don't, he may sell you again the old-fashioned retail store kind.

Let him know in time. Write him today and use the names ***Ring-Points*** and ***Juniors*** so that there will be no mistake.

Write for our new leaflet, telling "How You Can Permanently Stop Your Customers From Buying Cheap Screw Calks at Cut Prices at Stores," and for our new, complete catalogue and price list for 1912—just out.

The Rowe Calk Company

HARTFORD, CONN.

If you want to get High Prices, offer Quality Goods.

Trash usually brings exactly what it is worth.

Fill this in and mail it to Your Jobbers Today

(Name of place and State)

(Date)

To My Jobber:—I shall use Rowe Calks and Shoes next winter. Please have them on hand for me.

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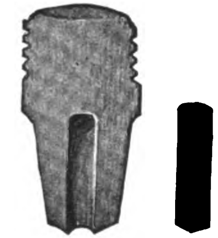
Golden Rustless Ring-Point, the new Long-Wear Calk

If You Want Protection on Screw Calks Next Winter Write to Your Jobber Today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There is one sure way of holding your old profits on screw calks.

You can keep your customers from buying cut-price goods at the retail stores if you have the secret.

Here it is:

Handle a line of calks that is different, and far better, than the old-fashioned junk calks sold by the stores.

Don't sell the same thing—of course your customers won't buy from you the very same brand of calks sold in the stores and pay you a higher price.

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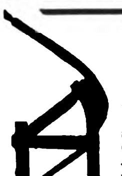

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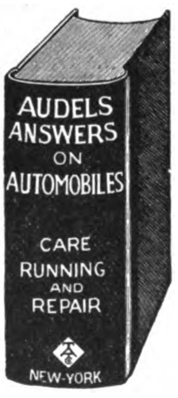

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BROTHER—Accidentally have discovered root will cure both tobacco habit and indigestion. Gladly send particulars. C. X. STOKES, Mohawk, Fla.

FOR SALE—Blacksmith shop, good 3-room house and barn. Address, A. C. CHRISTENSEN, Box 77, Tagus, N. Dak.

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FOR SALE—Machine and blacksmith shop, stock and tools. Good location; prices good. Going into other business. Price, $6,000.00. For particulars, address, SCHUSTER BROS., St. John, Wash.

FOR SALE—1 1-H.P. Air Cooled Gilson, $26.00; 1 2¼-H. P. Hopper Cooled, $35.00; 1 2-H. P. Stover Vertical with pump jack, $35.00. State your requirements before you buy. BADGER MOTOR CO., Milwaukee, Wis.

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BARGAIN—I have an American calking machine I want to sell. Guarantee it good as new. The price will save you some money. Write at once. A. A. A., care American Blacksmith.

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WANTED—To correspond with a blacksmith. Must be a married man and strictly temperate. Will pay $3.00 per day to the right man. Address, ALPHA JONES, Oregon, Illinois.

FOR SALE OR TRADE—One welding machine. PAUL RHOTEN, Rexford, Kansas.

FOR SALE—Blacksmith and wagon shop with tools for iron and wagon work. Plenty of work for three men. Also machinery and farm implement department. Inquire or write to NAPOLEON TROMBLEY, Stewart, Minn.

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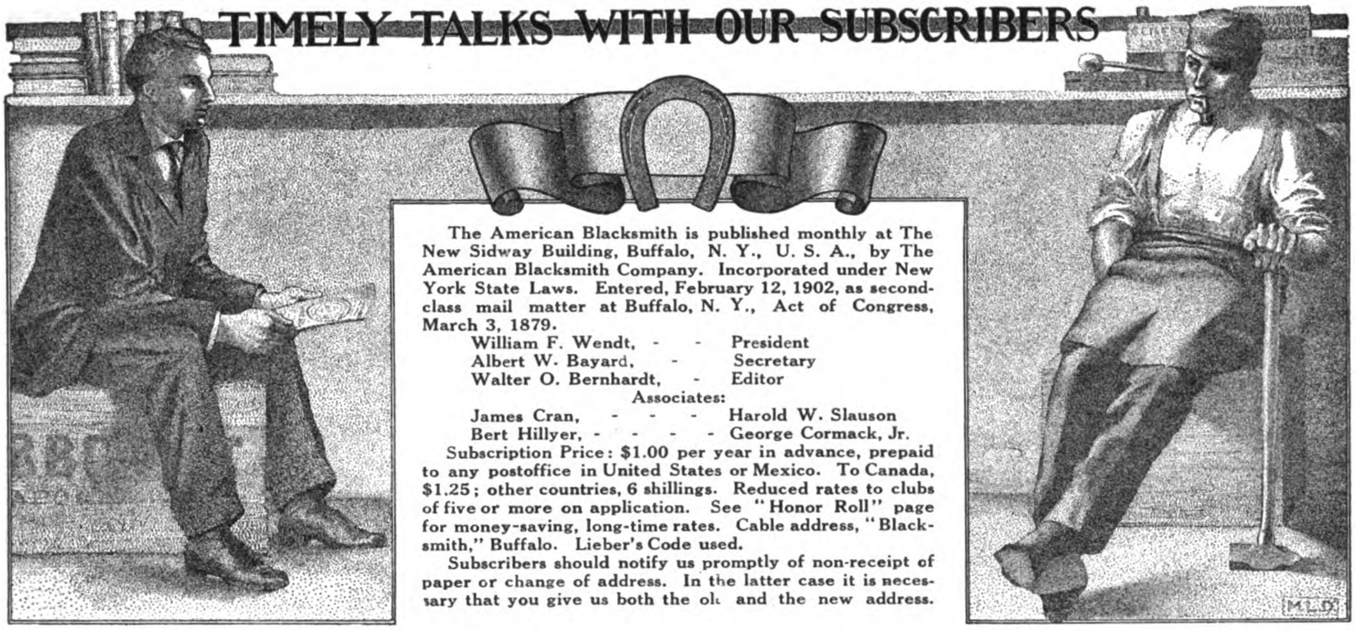

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Do you know—if YOU and every other reader of this paper would secure just one other reader we would have very close to fifty thousand or more readers? Why not try this scheme in earnest? YOU do your part—get one other reader during the next week. Surely you know of one other smith who will find profit and pleasure in the pages of "Our Journal." If you cannot call on him personally, write him a letter. We'll repay you for your time and trouble. But do it this week—we are counting on YOU.

And if you send us a new subscriber, we'll give you six months' credit on your own account or we will send you a guaranteed fountain pen; a neat watch fob with your initial on it; a rubber stamp bearing your name, business and address, and an inking pad; a hoof knife or a bench level. Will you give us a chance to send you one of these presents? Remember, we are counting on YOU—THIS WEEK.

Other Things

We don't often say a word about ourselves in these pages. In fact we cannot recall when we have said a word about ourselves as publishers. We have let you read letters that mentioned "Our Journal"; we have told you what some of "Our Folks" say about "Our Journal"; but we have kept all mention of ourselves out of these pages until now. And now we cannot resist the temptation to let you read a letter from one of "Our Folks" up in Canada. Our Canadian cousin writes as follows:

> "Your letter reached me today—if there was any doubt on my part as to the earnestness of the publishers to please their patrons it would have vanished. I enjoy the best journal published and know that the men back of it are all they claim to be."

This letter says more and means more in its few lines than anything we could say ourselves or try to prove. And coming as it does, unasked for (as do all the letters published here), adds pounds to its weight. If you believe you have any reason to think other than does this Canadian reader, write to us and tell us so. If you have a kick to make, fault to find or anything to mention in connection with "Our Journal," ourselves, our advertisers or anything else that we can remedy—write us fully about it and give us a chance to show you that we are all we claim to be.

Contents, August, 1912

Profit from the Advertisements

If you pass over the advertising pages of "Our Journal" with little or no attention you are not getting full value out of the paper. The advertising pages are heaping full of valuable and practical information. You cannot spend too much time on them. There are opportunities in those pages that can be made to pay you dollars and cents in real money. And, best of all, you can depend upon the advertisers;—the "Honest Dealings" paragraph and the Pink Buffalo Stamps protect you.

Are you getting full value out of the advertising section? How are you making use of the advertising pages? Won't you tell us how you make valuable use of the advertising section? Write a letter after going through this issue—or, if you prefer, answer the following questions. The main point, however, is to give us some information on how you get your money's worth out of the advertising section.

1.—Which advertisement in this issue do you consider best from your own viewpoint? Why?

2.—Which advertisement in this issue was first to attract your favorable attention? Why?

3.—What advertisements did you answer? Why?

4.—What articles advertised in this issue are you now using?

5.—What advertisements have influenced you favorably, i. e., what articles are you convinced you need and are going to purchase?

6.—What tools or machines are you using that are not advertised in this issue?

7.—How were you influenced in buying those tools, i. e., by a salesman or by advertising?

8.—How can the advertising section of "Our Journal" be improved?

Won't you let us have a letter from you along the lines suggested by the above questions?

Opportunities

For several issues we have been giving a list of opportunities where new shops are needed or will soon be needed. Have you taken up these opportunities? Have any of you located in these places? We have heard from several of "Our Folks" who have found these opportunities just what they were looking for, but we believe there are other readers who have not taken the time to write us. Won't you let us hear from you with a line as to just how you are making out in your new locality? It is always hard to build up a new business, and if we can help you we want to know about it. Just drop us a word or two today.

Apologies to Farm Imp. News

WILL YOU ANSWER OPPORTUNITY'S CALL AND ADD AUTOMOBILE AND GAS TRACTOR TO THAT SIGN?

High-Speed Steel

How to Harden and Anneal It

J. F. SALLOWS

A GREAT many methods are used in hardening high-speed steel, and it seems a great many have their own troubles. Of course, if nothing better than a common blacksmith forge is at hand, good results cannot be expected; especially if nothing better than smithing coal is used. For lathe tools and such this will do well enough, but when we come to handle expensive tools, such as reamers, taps and dies, we must be more careful. A great deal of trouble arises in the tool scaling, and coming from the bath all covered with little hard lumps. If a furnace is at hand, place the high-speed reamers in a box made from boiler plate, pack in fine wood charcoal, put on cover and place in furnace. Bring furnace up to 2000° F. or 2200° F., then take tool from box and quench in fish oil or kerosene oil. Have basket of wire suspended in oil tank, so as to allow tool to be away from bottom of tank where a great deal of sediment is usually formed. If a hot tool remains in the sediment to cool off it will come out dirty and scaly. See Fig. 1. This shows bottom of basket about 6 inches from bottom of tank. Fig. 2 shows a tank of oil with a large basket drawn up to allow oil to drain off.

If no furnace is at hand, then we must do the next best thing; build a cheap forge, about like the one in Fig. 3, and use lump charcoal for fuel and run the tool up to a lemon heat and quench in oil. Be sure to turn tool constantly to insure a uniform heat.

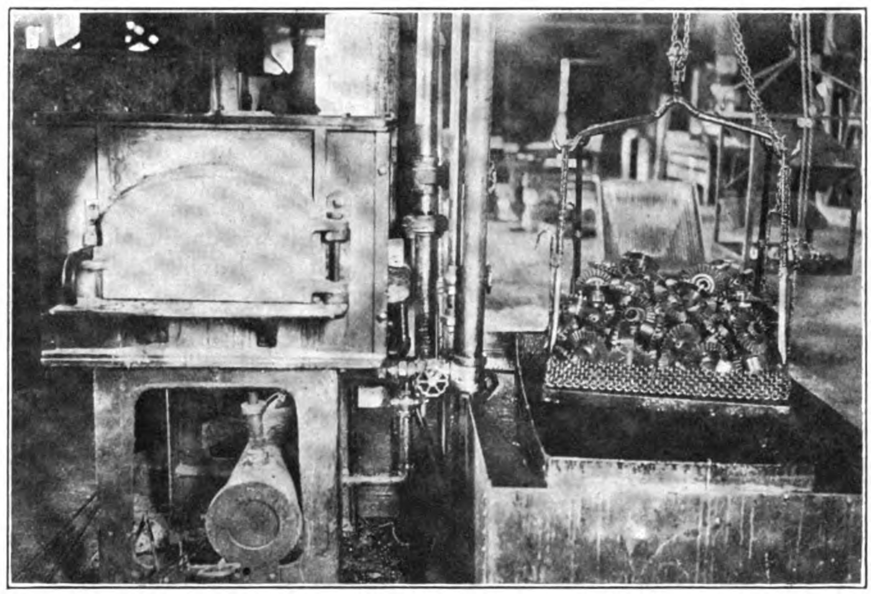


FIG. 2—LARGE OIL BATH, WITH BASKET RAISED, BESIDE FURNACE

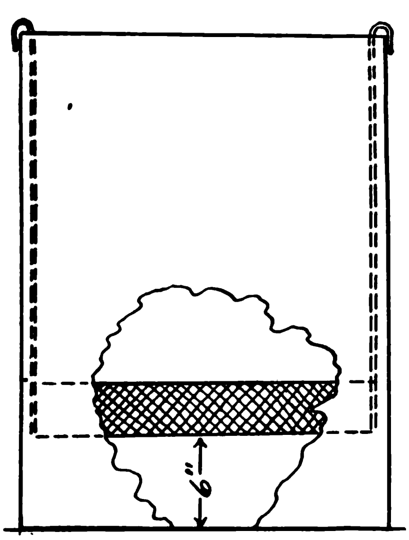


FIG. 1—QUENCHING TANK WITH BASKET PROPERLY HUNG

If a hollow mill, use a stud as shown in Fig. 4. This stud should be turned up to fit the hole in the mill and threaded on its outer end for the nut, N. The other end, H, should be drilled and tapped out for a piece of half-inch pipe, P, about 24 inches long, with which to handle the mill. The head of the stud should also have two lugs or projections, L, one on each side to fit into the slots in the end of the cutter. If the mill is heated in a furnace, no pipe handle will be necessary; but a furnace will scale the mill badly and tend to crack it—I prefer a charcoal fire.

To anneal high-speed steel, pack it in a box with lime, place in furnace and heat to about 1600° F. for about five or six hours; then remove box from furnace and let cool. The tools will be found to be as soft as a piece of common iron. If annealed as we do tool steel, that is to heat in forge and lay it down to cool, it cannot be machined, but will be found to be very hard.

The oven or forge shown in Fig. 3 can be made of ⅛-inch sheet iron. It is supported on iron legs made as shown and one fastened to each corner of the forge. The forge is here shown with a hood and stack. Neither of these is absolutely necessary; in fact the front side of the forge with the door may be done away with entirely. The tuyere is eighteen inches long, six inches wide, and the entire top of the tuyere is drilled with ⅜-inch holes about ⅜ of an inch apart. The bottom side of the tuyere should be inclined as shown so that dirt and cinders can be blown out at the pipe at X. This pipe should have a cap screwed on it to close it tightly when the forge is in use.

A tuyere of the size stated can be used for heating large articles quickly, and when small tools are to be heated the fire can be narrowed by laying a firebrick or two on each end of the tuyere. The size to which we build a forge of this kind depends upon the amount of work to be done. Charcoal should be used as a fuel for heating in this forge, though when a large piece is to be heated the sides of the charcoal fire may be banked with smithing coal.

Some Tempering Questions Answered

F. H. Galway

There seems to be a number of ever-recurring questions in the mind of the average smith. At least an observation and reading of the pages of the trade press seems to indicate such. And of all the questions that appear at repeated intervals the one regarding the tempering of springs seems to be the most persistent; with the one on mill picks a very close second.

In regard to the hardening and tempering of springs, the average smith seems to have the idea that there is considerable mystery, secrecy and what-not connected with the work, or at least successful work. Successful spring workers, I think, will admit that there is no mystery, little secrecy and nothing else but common sense used in connection with the hardening and tempering of springs. And of all things used in hardening and tempering springs the most important is common sense. See that you have a liberal supply of it before you attempt to solve any hardening and tempering problems.

Now to properly temper springs it is of course understood that the steel is correct and that is has not been overheated. For medium-sized springs use a mixture of one half gallon neatsfoot oil, one half gallon sperm oil and one ounce of rosin. Small and medium-sized springs will temper properly in this bath if common sense is used. In heating springs heat them evenly. It is worth time, trouble and patience to take special care in heating if you want good results. And good results will not be the rule if you do not heat your springs evenly.

On heavy springs use hot water for your quenching bath. The water should be boiling when the spring, heated to the proper degree, is plunged into it.

For heating small springs it is well to place them in a tube or pipe of a size to admit them easily. Then drive a plug into one end of the pipe and bury it well in the glowing coke of the forge, leaving the open end of the tube to project a few inches. In this way the springs are heated evenly; which would be almost impossible over the open fire.

Some smiths seem to have great respect for the "burning-off" method of spring-tempering. Others seem to think it a rather haphazard, rule-of-thumb method. I have found the burning-off method excellent sometimes, while other times it has not worked successfully. In describing this method some smiths recommend fish oil. But I believe cottonseed oil to be better. Some, however, use a mixture of both cottonseed and fish oils; but this is perhaps a matter to be determined by practice in each individual case.

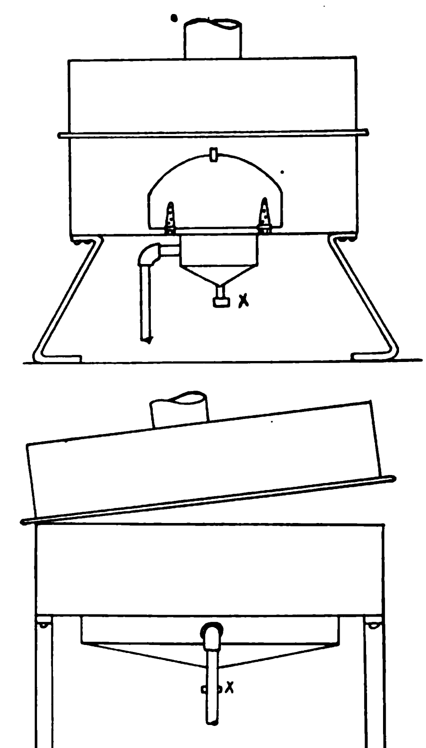


FIG. 3—A SIMPLE SHEET IRON FORGE, EASILY BUILT

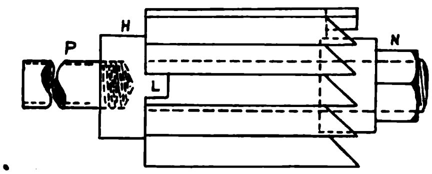


FIG. 4—HOLLOW MILL ON STUD READY TO TREAT

One smith I know, and a good one too, uses nothing but fish oil in treating springs of all kinds. He heats the spring to a medium red very carefully. This heat he describes as "between a very dark red and a light red with a leaning toward the dark side." When at the proper heat he plunges the spring into the fish oil, allowing it to remain in the oil until cold. He then takes it out, flashes the oil off over the fire, again quenches it in the oil and then lays it out until cold. This man's success in treating springs seems to indicate that his method is correct. However, I am still partial to the oil and rosin mixture for light and medium springs, and to the hot water treatment for heavy springs. This is perhaps because of my better familiarity with the latter and does not argue for or against either method for other smiths.

To harden and temper mill picks so they are hard and tough, mix up the hardening bath as follows: To 4 gallons of rainwater, add 2 ounces of corrosive sublimate, 4 ounces of sal-ammoniac, 1½ quarts of rock salt and 2 ounces of saltpeter. This solution should not, of course, be mistaken for a thirst-quencher, and should be plainly labeled whether in or out of use.

The steel for making picks must be heated carefully and worked at a low heat. Be careful not to overheat the metal. When properly worked and shaped, heat the end of the pick for about two inches; bringing the heat up to a cherry red. When properly heated, cool in the bath described and your picks will be hard and tough.

Some toolsmiths recommend the lead bath for heating picks for tempering; but for the average smith who has only an occasional job of dressing mill picks the lead bath presents difficulties. With the bath described it is unnecessary to draw the temper. The picks will stand up well and will not break.

A Practical Quenching Tank for Casehardening

J. F. Sallows

This quenching tank was mentioned and briefly described in an article on casehardening which appeared in these pages some time ago. We now show working drawings of the tank and describe the proper material of which it may be constructed. While the tank is patented, this need not deter anyone from making one for his own use. Those desiring to purchase tanks ready-made can obtain full information regarding them by communicating with the writer.

The engraving at Fig. 1 in connection with the side elevation of the tank in Fig. 3 gives an excellent idea of the completed tank. Fig. 2 shows the tank ready to receive the parts to be quenched. In this view of the tank the inner frame of the device with its slides is immersed in the tank. The casehardening box packed with pieces to be casehardened is removed from the furnace and placed on the shelf at A. The box is then dumped on the inclined sieve, B. The pack-

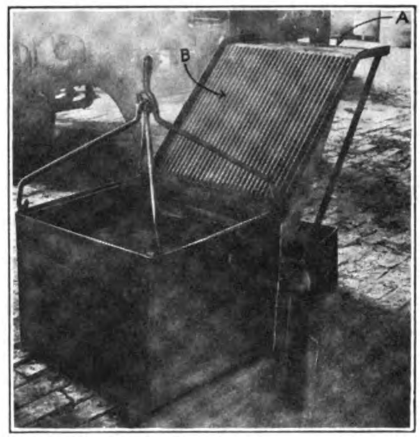


FIG. 2—TANK READY TO RECEIVE WORK

ing or casehardening materials here separate from the parts to be hardened and fall into the pan, C, by way of the hopper, D. The parts to be hardened slide down into the tank of water and are kept on the move by the slides, E, E, E. These slides tumble the parts about in the water so as to cool them perfectly by the time they reach the basket, F, at the bottom. After dumping the boxes the inner frame of the tank is raised; bringing the hardened parts to the top of the tank so they can be easily removed from the basket.

The side elevation of the tank as shown in Fig. 3 represents the inner frame of the device immersed in the tank. It will be noted from this engraving that the bottom of the tank is sunk into the floor or ground for a distance of 12 inches.

The tank itself is 24 inches square by 36 inches deep. The frame which carries the inclines and the basket at the bottom fits into the tank as closely as possible so as to prevent the smallest part to escape either the inclines or the basket. It will be noticed in this connection that the sides of the basket are riveted on the outside of the frame itself.

The tank is made of $\frac{1}{8}$-inch boiler plate. It is fitted with three $1\frac{1}{2}$-inch pipe couplings as shown in Fig. 4. One of these couplings is in the center of the bottom of the tank, while the other two are in the side; one being centered 2 inches from the top edge, while the other is centered $1\frac{1}{2}$ inches from the bottom of the tank. The four lugs which hold the dumping screen and hopper supports, and which are shown at A, A in Fig. 9, are riveted to the tank; two being placed at the top edge on the side opposite to that containing the pipe

A PRACTICAL QUENCHING TANK FOR CASEHARDENING—THE INNER FRAME RAISED

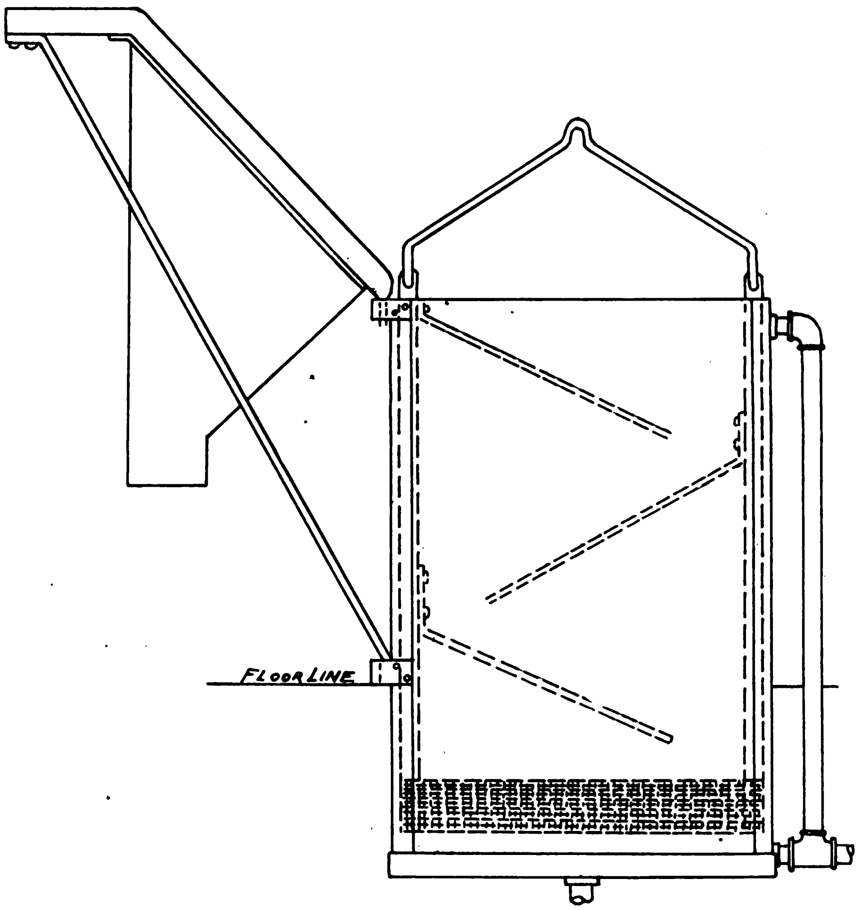


FIG. 3—SHOWING SIDE ELEVATION OF THE TANK WITH INNER FRAME LOWERED

couplings. The lower supporting lugs are just above the ground line of the tank, or 24 inches below its top edge.

The details of the inner frame and the inclines are shown in Fig. 5. All dimensions for the making of these frames are given, and the making of them should therefore be easy if the directions are followed. After the frames for the inclines are made, the perforated metal is riveted to them. The material used is 15 B perforated metal of No. 16 gauge. The dimensions and shape to cut are shown in Fig. 6. In this same engraving are also shown the design and dimensions of the two hangers for elevating and lowering the inner framework.

In Fig. 7 are shown details of the box rest and the dumping sieve. All dimensions are here given and the number of pieces for each part is specified, so little difficulty should be experienced in getting this part of the device correctly constructed.

The hopper is the next part to construct. This is shown in Fig. 8. This hopper should be made of heavy galvanized iron. It is riveted to the bottom side of the dumping sieve and carries the hardening materials or packing into the box or pan placed below its spout. This material is oftentimes used again by mixing with new material or even alone without the addition of any new element.

The only parts of the tank now remaining are the two brace rods which support the dumping sieve and hopper. These rods are 48 inches long before bending. They are formed from ¼ by 1¼-inch stock, and each end is bent 1½ inches from the ends at an angle that will give the dumping sieve a proper inclination. The bent part at the upper ends of each rod is drilled for rivet holes, and these ends are riveted solidly to the angle pieces forming the supports for the box rest. The other ends of these braces are simply inserted into the lugs at the floor lines on the tank.

For heavy work, and for which the inner frame and inclines are too light and would be quickly bent out of shape, a screen similar to the one shown in Fig. 9 may be constructed. When this screen is to be used, the

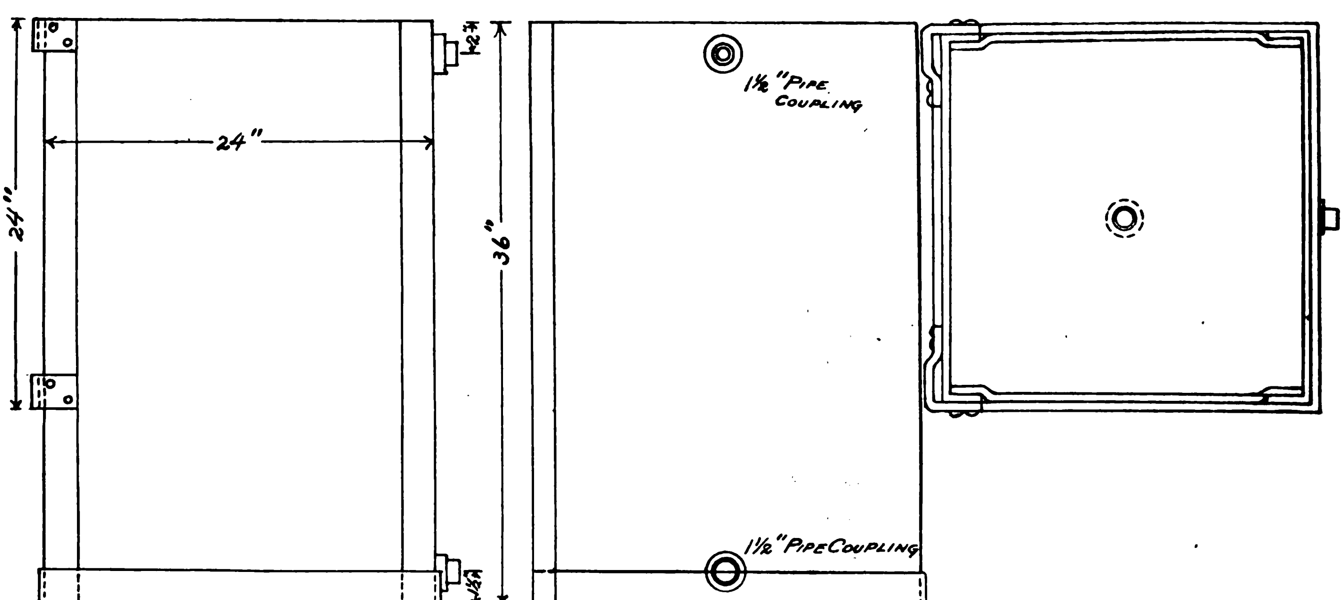


FIG. 4—A SIDE ELEVATION, AN END VIEW AND A TOP VIEW OF THE TANK ITSELF WITHOUT OTHER FIXTURES

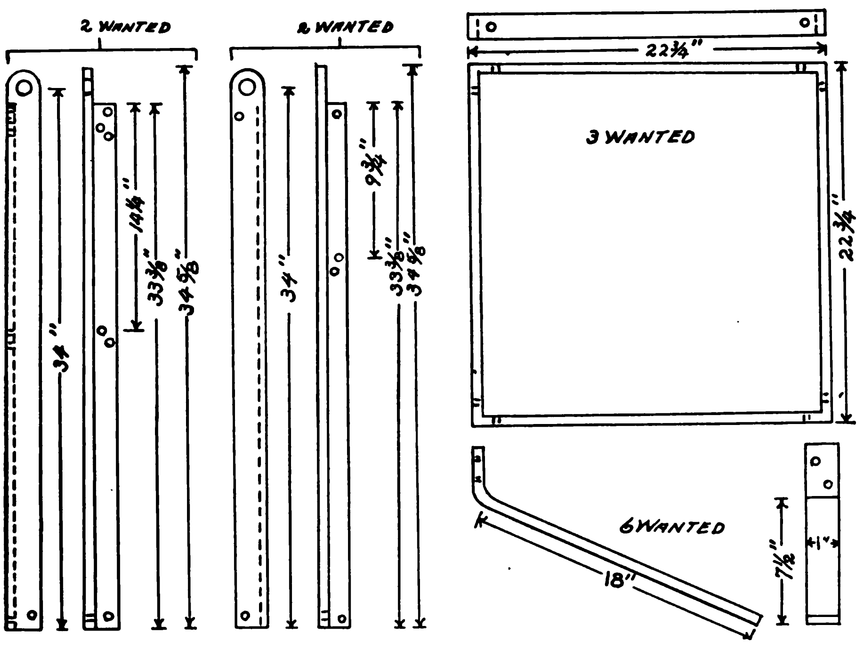


FIG. 5—DETAILS OF INNER FRAMEWORK AND THE INCLINES UPON WHICH THE WORK TUMBLES

other framework with attached inclines is removed from the tank and the heavy screen hung in the tank. This device as shown in Fig. 9 will hang in the tank about at the floor line. It may be easily constructed by observing its details as shown in Fig. 9.

Crucible Steel in Comparison with Other Steels

In *Tool Steel and Its Uses*

J. C. Scott

It is acknowledged by all authorities that crucible steel is the best, in all respects, that can be made; and that is why it is used exclusively for high-grade tools, guns, projectiles, and all work where the finest grade is required. Some of the reasons why crucible steel is better than any other steel are:

Crucible steel is melted in a covered pot. This prevents the steel from absorbing nitrogen and other gases. Open hearth or tropenas steel is exposed to the flame and air; being injured by the gases absorbed.

There is no oxidation in the crucible process. No ore is used in this process and no sharp flame can attack the metal. This insures a quiet metal, free from oxide of iron.

No physics or dopes required in crucible steel. The addition of silicon iron, spiegel and ferro-manganese to steel, which are necessary in the open hearth and tropenas process, do nothing but remedy defects in melting.

Crucible steel ingots are more free from pinhole defects. In order to obtain solid steel ingots, especially small ones, it is necessary to have the metal hot enough when poured into a mould to allow the gases created by pouring to work. If the metal is not hot enough to allow this it will cause pinholes, so prevalent in open hearth and tropenas ingots, no matter how good the steel may be when it comes from the furnace.

The crucible process insures the highest heat. When steel is melted by the crucible process it is taken out of the furnace in the same covered pot in which it is melted; the pot being at a white heat is taken immediately to the moulder for pouring. This insures a good heat in the metal when in the mould. In the open hearth and tropenas process the metal after being ready to pour is transferred to a ladle, which is much cooler than the furnace. This causes a great loss of heat; not only on account of the steel coming in contact with the cooler ladle but because it exposes the metal to the atmosphere while running from the furnace to the ladle.

The chemical composition of crucible steel is more uniform. The chemical composition of steel varies with the temperature and the time exposed to the air. The first ingots from the ladle of an open hearth furnace or tropenas convertor are higher in carbon, silicon and manganese than those poured later; caused by the metal being exposed to the air. This is not appreciable in crucible steel.

The small quantity of metal in a pot guarantees better ingots. The high heat of crucible steel and the small quantity contained in a pot guarantee better ingots of a more even composition than is possible in other methods of making steel.

Crucible steels have the highest tensile strength of any carbon steel made.

The Future of the Craft Depends on the Present

T. R. Mann

I wonder when we are going to get out of the rut that we have been in ever since the beginning of time?

Are we to continue to work with little or no thought for the present or future? Or are we to wake up and take our place in the line of progressive trades that depend on us for the tools and appliances with which they have covered themselves with fame and put themselves on the road to wealth, influence and social standing?

Nearly all of us have got some sort of a kick to make; sometimes it is

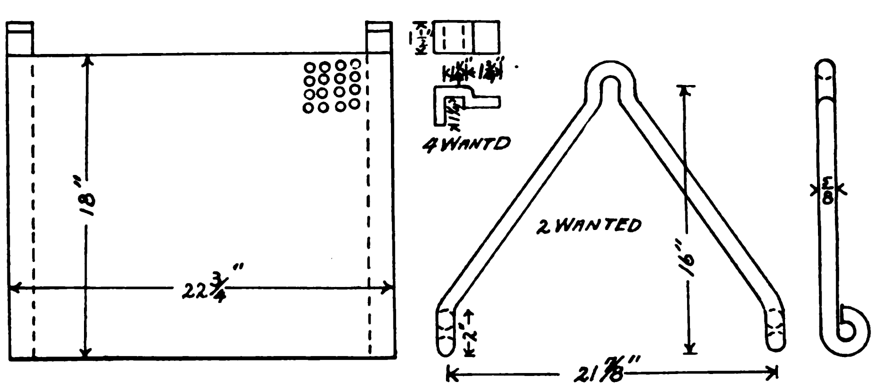


FIG. 6—SHOWING THE PERFORATED PLATE OF THE INCLINE AND THE HANGER OF INNER FRAME

the other fellow that is the cause; sometimes the climate; but most times it is ourselves.

Our trade is full of misfits and fellows who work at it because they like to tinker, wear an apron and show their muscle. It is no wonder that the only boys who finish their time or apprenticeship are the ones who have poor powers of observation and do not see where they are at until it is too late to change to a plumber, carpenter, engineer, or possibly a lawyer, doctor or minister. The latter being nearly in the same position as the blacksmith when it comes to dollars and cents.

Give the boy a chance; teach him that the trade of the blacksmith is equal to any profession; see that he learns it and learns it right and, if he cannot, tell him so. Don't make a botch out of the boy. Let him become a monument to your memory, and if you can't do this with the proper material you had better work at something that you can do. Of course this is easily said, and anyone familiar with the subject can say something, but are we willing to do something that is going to put a stop to cheap competition, botch workmen, poor pay, bad debts and sweat-shop methods.

Let us copy, at least for a time, some of the business methods of the corporations that have taken bread from our mouths with one hand and given it back with the other after manipulating it so that it gains or doubles in size; but when we get it back it is no larger and, many times, smaller. The corporation taking their toll or bonus and thus creating the wealth of the world.

Their workmen are masters or they don't get the work. Their system of business is perfect. Their product is protected and this protection goes to the limit of the law, and if there is no suitable law they have one made.

So, let us blacksmiths in our might and brawn, with all our intelligence and ignorance, speed and good intentions, stand up for our rights when we deliver the goods. And if we can't deliver what we are claiming to be capable of let us be men and take our place a notch further down or up, as the case may be, and not try to make a trade that should lead all others a makeshift or the means of an existence.

I have worked as a blacksmith twenty years and under all kinds of conditions and with all kinds of tradesmen. Quality comes first; quantity second; and with a reputation attained by honest work, straight business methods and a little dignity and self respect a blacksmith can stand among the best men of our nation.

Let us have further discussion upon these matters. If you have any ideas or thoughts let us have them. It may do the craft considerable good.

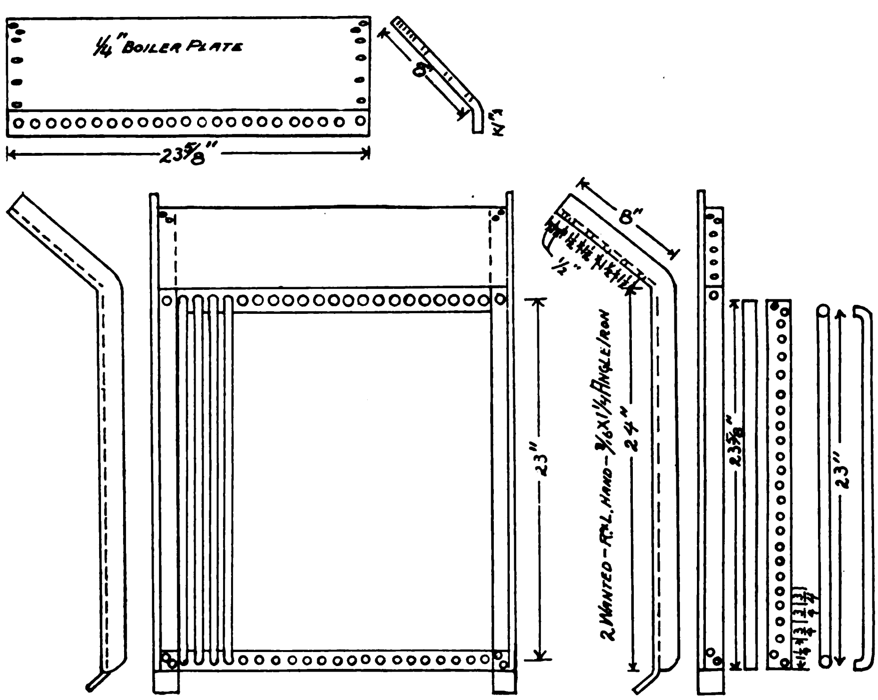


FIG 7—DETAILS OF THE BOX REST AND THE SIEVE UPON WHICH THE WORK IS DUMPED

Welding Bands and Rings Under the Steam Hammer

F. G. Arnold

For the smith who has bands or rings to weld in any quantity the following suggestion may be of considerable help. Special dies are of

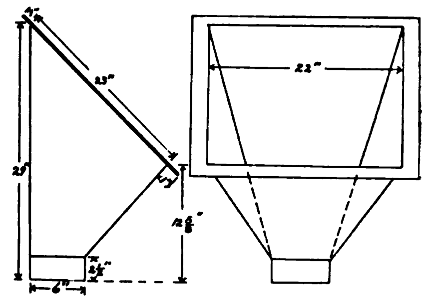


FIG. 8—THE HOPPER WHICH CARRIES OFF THE MATERIALS

course necessary; but the time, trouble and expense of constructing these will be more than repaid in the quickness with which the bands and rings can later be welded.

The engraving shows the dies or tools that are needed. A V-block is necessary for use on the bottom die of the hammer. This block should have its V conform with the radius of the ring to be welded. The top tool is made as shown and is used with a handle to permit its being moved backward and forward as welding progresses. The rings or bands are held between the tools as illustrated in the engraving. This enables a smith to weld up spile bands, collars, spring bands and the like very fast. Of course unless a smith has this work to do in quantity it would be unwise to make these special tools.

Rings made from round stock can also be welded in this way with a slight change in the tools.

Meeting Competition—4

A Series of Talks on Common-Sense Ways of Meeting Fair and Unfair Competition

By Thornton

Now the matter of catalog-house competition on vehicles, vehicle parts and the like. Let me show you how one bright smith meets this competition. A customer whom we will call Mr. Brown comes into the shop of our friend Mr. Green.

"How much do you want for a

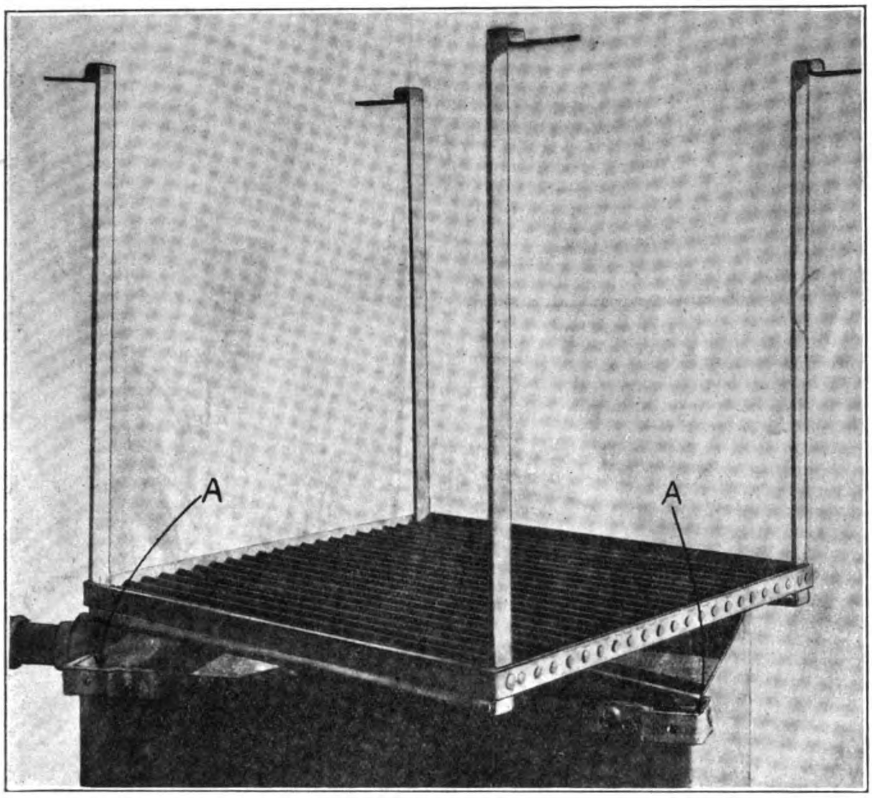


FIG. 9—A SCREEN FOR HEAVY WORK MAY BE CONSTRUCTED AS SHOWN HERE

set of whippletrees with neck yoke?" asked Mr. Brown.

"Well, I have some all ironed, nicely painted and ready for use that I get $2.75 a set for. They are what I call competition brand," and Mr. Green took Mr. Brown back to where the trees were hanging and explained their points of merit. After a short talk, Brown said: "That looks like a good set, but I can get the very same thing from Rear, Sewbuck, for $2.35."

"I'll sell this set for the same figure," quickly agreed Green, "and on the same terms and conditions as the catalog-house."

"All right, I'll take them. Just have your man throw them on my wagon," and Brown was about to go out, as he had a charge account.

"Not so fast," said Green. "We'll need to do a little figuring first. I said I will sell the set on catalog-house terms and conditions. So you see we must take the catalog price of $2.35 and add to that two cents for your letter containing your order. Then there is five cents for the cost of a money order and then the freight from 'Catalog Town' to here would be about forty cents—that's low, but we'll figure that anyway. Now let me see—that adds up to $2.82. That is just seven cents more than I asked and I have the set right here ready for you to use. No waiting for two weeks."

Well, that little demonstration changed one man from a catalog-house customer to a home-town customer. And Green is not green at all, but an up-to-date smith who handles his customers right and with little trouble. He is a bright, active business man, beside being a good all-round smith. He handles one line of supplies just to meet catalog-house competition. He gets all the catalogs and looks over their lines and knows when a customer is bluffing or telling the truth about catalog-house prices. Of course, he also makes up vehicle parts for which he gets a good price and upon which he makes a good profit. The competition lines he sells for just enough over cost to make expense and meet price. And in some cases, though they are few, he sells some items at cost. It is needless to say that smith is doing a big business and it's growing bigger every day.

Another smith over in Ohio, who makes a specialty of vehicles—he builds some while others are from good reliable factories—is beating the catalog-house at their own game. He gets out circulars from time to time showing three or four styles of vehicles and giving a description of them in full, from the kind of wood used to the color of the paint. Then at the bottom of each page he tells what a vehicle similar in grade would cost in "Catalog Town" and what it would cost to get it into town. This demonstration of actual saving by trading at home, the satisfaction of seeing the vehicle before paying your money, the responsibility of a man you know and whom you can see and talk to every day and any day, are points that this Ohio smith takes up carefully in his circulars. And he's doing more business than ever. You see, before, he waited for business to come to him, now he goes out after it, and he gets it, too.

My investigations along the line of catalog-house competition have led me to believe that, given a fair chance, the local business man can beat the catalog-house out on every side. And the local business man will have a fair chance if he will but take it.

And now to summarize on how to meet catalog-house competition:

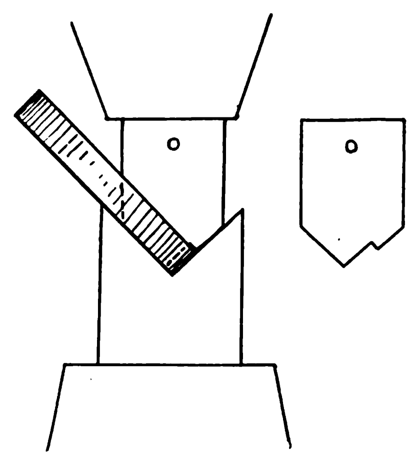
Handle goods and supplies which you can sell at about the same figure as those sold by the catalog-house.

Keep your eyes and ears open to what the catalog-houses are doing.

Get their catalogs and look them over carefully.

Know catalog-prices, quality and goods thoroughly. Then when a customer mentions catalog-house goods you'll know if he's "stringing you" or not.

Push for more business just as



WELDING BANDS AND RINGS

hard as you can. Advertise intelligently, work intelligently and do business intelligently.

If you handle incidentals of any kind: axle grease, stock foods, etc., don't purchase any more than you

can sell within a reasonable time. Keep the stock fresh and clean appearing.

Turn your stock over quickly. Unless there is a good reason, don't overstock in rough supplies, such as wood, steel and iron material.

In closing this talk I want to say that I do not consider the catalog-house a very serious competitor to the average smith and general worker. There are, of course, smiths in various localities who find the catalog-house a serious competitor; but the average general blacksmith at present has little to be afraid of from the catalog-house.

(*To be continued*)

Gate and Door Hinges of Earlier Days

The hinge of the present day has but one office to perform, i. e., to allow one of the two parts joined by it to swing freely. In earlier days—the Romanesque and Gothic periods of architectual history—hinges not only performed their present-day office, but they also helped very materially to bind the door together. During these periods doors were made of narrow boards fitted together in tongue and groove fashion. The hinges of those days were great, large heavy affairs of wrought iron and covered very nearly the entire surface of the door; the hinges and their nails, screws or rivets assisting greatly to hold the boards of the door together. Naturally, the smith of those days, in order to give the door a pleasing appearance, modeled his hinges in artistic fashion. Several hinges of this style, i. e., for this double purpose, are shown in the engraving, Fig. 1. The reader can readily picture those long hinges spreading out across the door and giving it a very pleasing appearance. The hinges shown are of the smaller styles of large hinges. The ones referred to as covering the entire surface of the door were great, ponderous masses of scrolls, twists and curves that were masterpieces in themselves.

The specimens shown in Fig. 1 are of the time when hinges were beginning to be made smaller. Doors were being made with panels instead of the old tongue and groove style; and the hinges could no longer cover the entire width of the door. This accounts for both small and large hinges being shown together as examples of 16th Century work. From a design that went across the door, hinges changed to a pattern that confined itself to the narrow framework of the door.

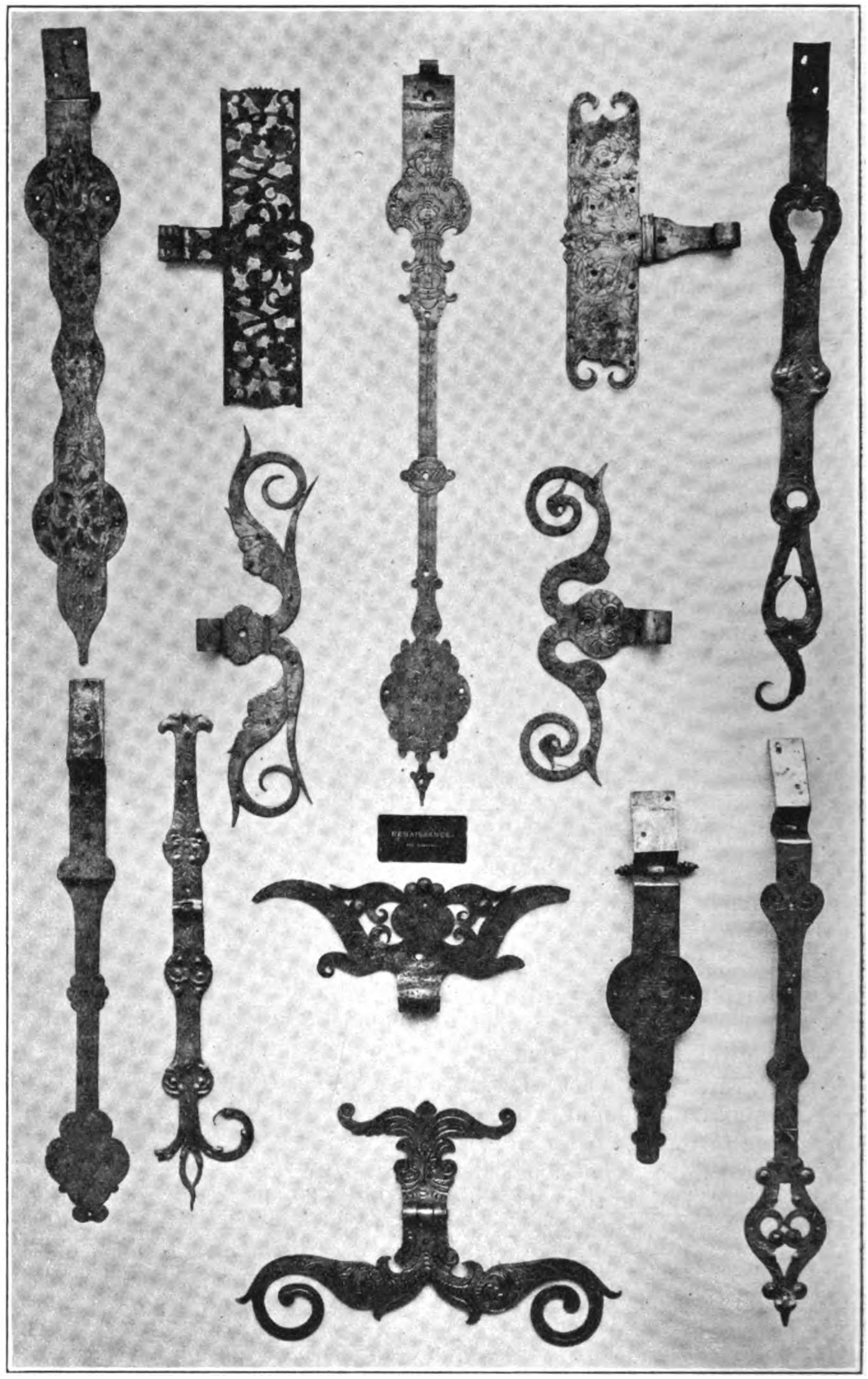


FIG. 1—GATE AND DOOR HINGES OF THE RENAISSANCE PERIOD—HINGES WERE BEGINNING TO BE MADE SMALLER

The ornamentation of the hinges of this time (Renaissance—16th Century) depended to a considerable extent upon the markings with a chisel and to embellishment by embossing. Then, too, hinges were sometimes further ornamented by coloring the design so as to present the appearance of applique work on a background of contrasting color. The hinges shown at the top of Fig. 1 and the second from the left are excellent examples of this contrast work. The long hinge in the center at the top is by a well-known smith of his time—V. Gillar of Vienna or of Wien as it was known in those days. There is another example bearing this smith's name shown in Fig. 2. It is the piece in the right top corner. This piece is of a later date and is of different style; though the first mentioned piece shows better style and design.

The specimens shown in Fig. 2 are of the 17th Century and show hinges that were evidently intended for paneled doors. These hinges show very fine workmanship, but are not as good in design as the long hinges shown in Fig. 1. This is undoubtedly accounted for by the fact that the narrow hinge was a newer style for the smith because of the change in the method of making doors and the change in door styles. The hinge shown just below the title card in Fig. 1 bears a most peculiar design. Instead of an outline of chisel markings, as is the case in the other hinges, this hinge shows its entire surface covered with short chisel marks in a peculiar pattern. The markings covering the upper part are short straight lines, while the lower arms show short curved lines.

Who's To Blame?

Here's another case of who's to blame? In this instance the shoer apparently had no chance. His encounter with the vicious animal resulted in a badly broken jaw and lacerated face. If this had happened to you, who would be to blame? Do you have an understanding with your customers?

Porterville, (Cal.), June 9.—While attempting to shoe a vicious horse, yesterday afternoon, Harry Godfrey of this city was knocked down and kicked twice by the animal. One blow struck Godfrey on the shoulder and is not serious; the other, delivered with terrific force, caught him flush on the point of the jaw. The jaw bone was broken in two places and Godfrey's face was badly lacerated. The attentions of a doctor and a dentist were necessary to replace the broken bones of the jaw and an operation will be necessary before the breaks can be properly bound.

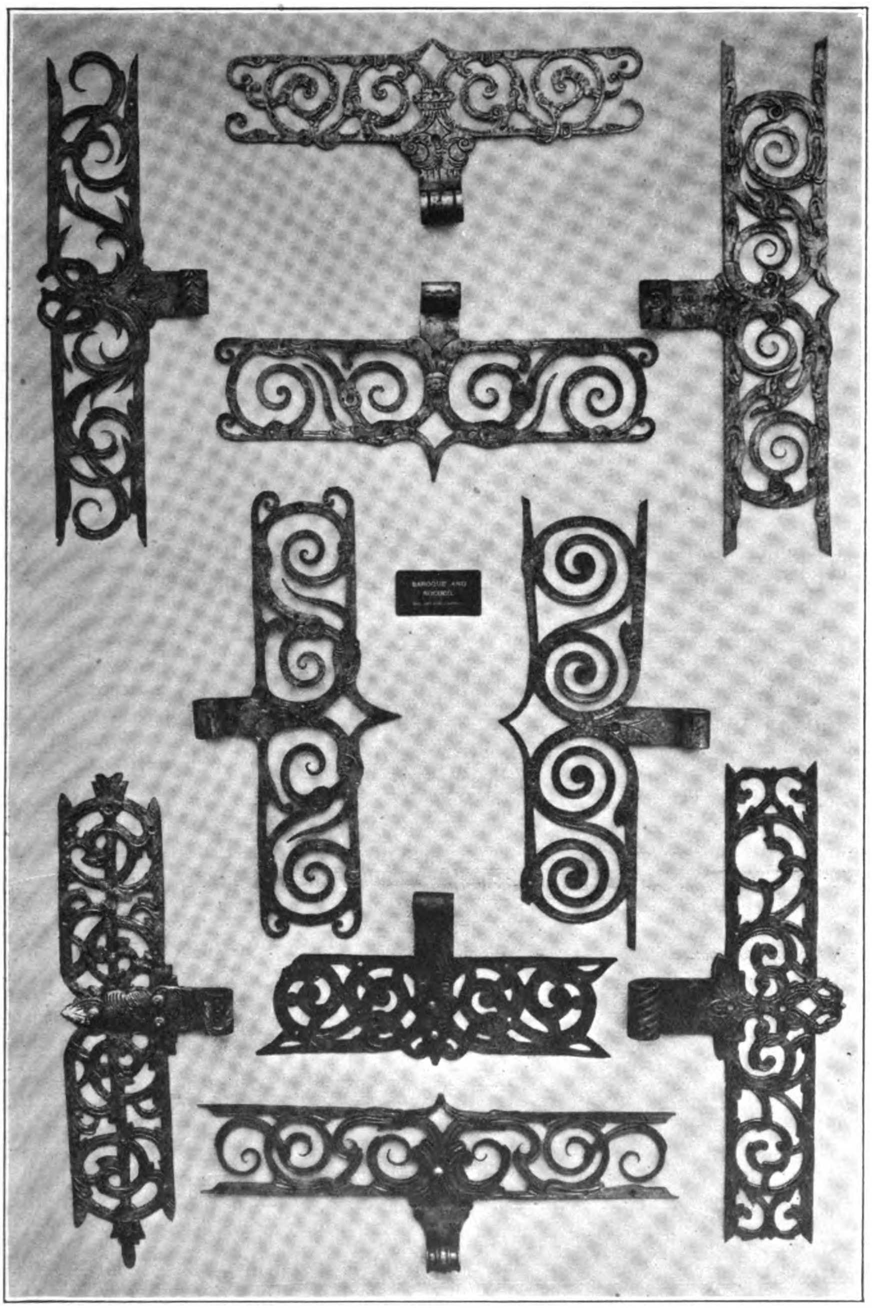


FIG. 2—SOME SPECIMENS FROM THE SEVENTEENTH CENTURY EVIDENTLY INTENDED FOR USE ON PANELLED DOORS

Plain Facts About Competition and Organization

W. H. Chambers

Just received Thornton's first article on meeting competition the business way. Most of it is all right, and all of it may be all right in some places with some people.

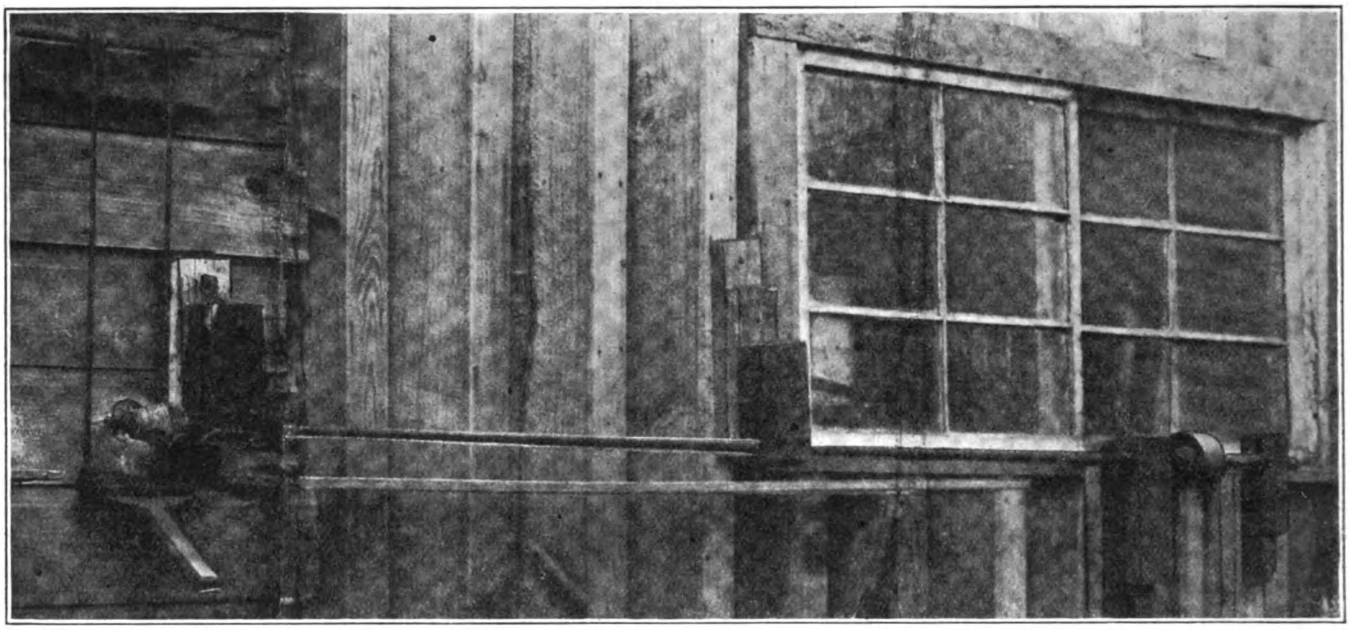
The success of blacksmiths as organizers has not been encouraging thus far. I went into a town of about two thousand people where there were five shops with different prices all around. I would be tempted in putting any amount of confidence in the man I was talking to until I got to the next shop. Then it was a wonder to me how he ever kept out of the county jail,. However, I learned more about them by experience later. I started a shop in a new town near by; got a list of their prices and tried to adhere to them. When doubtful I would ask some smith. One told me to charge $6 for the work on a wagon axle, the customer to furnish the timber; $3.50 for the work on a plow beam; 75 cents for sharpening lister weeders, etc. I found the axle price was about double; the plow beam $1 high; and after I had tried to collect 75 cents for the weeder blades the customer told me that the same smith who had given me the above prices charged 40 cents a piece for sharpening, or 35 cents when the twelve were brought in at one time. The result of it was that the people would come to me once and then go twelve miles further the next time. That kind of a price-cutter is the worst to deal with.

I also had some experience in organizing in Indiana. My competitor suggested that we call a meeting of the smiths, and organize and raise prices. The result was a nice little organization, with four counties and fifty blacksmiths represented. We raised prices about 15% to 25%. Everybody adhered to them at first,

but finally went back to the old prices. Upon investigation I found that two shops in the town next to me, and just four miles away, were shoei g for $1.75 per span, rough shod, and a rough job. I upheld the higher prices, and finally business was picking up again when one evening the liveryman came in and asked me to give him a ten-cent reduction on his shoeing. I found out that the same "good brother and friend to the craft" who had requested me to help start the organization had offered to cut the livery shoeing ten cents. He also had told all of my customers who would listen to him that I was the starter of the high prices, and that he knew it was unjust and tried to use his influence against it, but that nothing could prevent me from raising the prices. This has shaken my confidence in the majority of the anvil and hammer tribe, although I know that there are some who are true blue. There are, however, just enough of the other class to make life miserable for us.

Now as to quality. Nothing appeals to me more than quality, and I like to see quality in the smith's character as well as in the goods. I like to do good work and, if I don't do it, it will be because the customer will not give me time or I don't know how. I carry good stock. There are a great many people, however, who want something for nothing, and you can talk quality forever without making an impression. They prefer to go to the other fellow who does inferior work for a few dollars less. There is one class of farmers and customers who never question the price, nor do they bother about what they can get a job done for somewhere else. If it is fixed, and fixed right, that is what they want and they consider it worth paying for. But such a customer is the exception.

I don't agree with Thornton as to doing cheap work if the customer wants it, unless it be in the finish. If he would prefer it in the rough, rather than wait, it is all the same to me, but as to actual workmanship, a man can make a good weld just as cheaply as he can a poor one, and he can set a tire right just as easily as he can set it wrong. But the quality of stock would count.



THIS SICKLE SHARPENER IS SIMPLE IN CONSTRUCTION, YET WILL DO THE WORK QUICKLY AND EASILY

Opportunities

Here are listed a number of live opportunities for live blacksmiths—towns and localities where blacksmiths are needed. If you want to start anew and if you have the necessary energy, skill and perseverance to stick to business until business sticks to you, get into touch with these business chances. Write to the man or firm named under each address.

OHIO—at Sundale.
Address J. A. Riddilo.

ARKANSAS—at Southland.
Address Wm. Russell & Co.

There is a good chance for a competent man here. The town is waiting for a good smith.

MISSISSIPPI—at Chapeltown.
Address Roberson & Pau.

MISSISSIPPI—at Glenfield.
Address A. J. Russell.

MISSISSIPPI—at Austin.
Address H. S. Yerbrough.

MISSISSIPPI—at Dry Grove.
Address C. A. Williams.

MISSISSIPPI—at Artesia.
Address Postmaster.

MISSISSIPPI—at Groveton.
Address Postmaster.

MISSISSIPPI—at Kirkville.
Address L. A. Lollar.

MISSISSIPPI—at Hintonville.
Address Postmaster.

MISSISSIPPI—at Irene.
Address W. L. Powell.

MISSISSIPPI—at Gladys.
Address Crowell & Williams.

MISSISSIPPI—at Jack.
Address W. S. Graves.

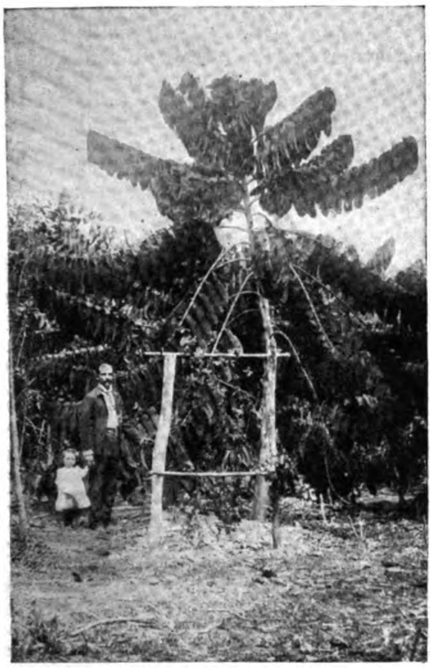
MISSISSIPPI—at Goss.
Address D. L. Butler.

MISSISSIPPI—at Moscow—R. 2.
Address W. R. Fite.

MISSISSIPPI—at Laine.
Address Postmaster.

OHIO—at Sumner.
Address Postmaster.

OHIO—at Strobel.
Address Postmaster.



THE RUBBER PLANT ON ITS NATIVE GROUND

OHIO—at Storms.
Address John Gregg.

OHIO—at Syracuse.
Address E. Mallory.

OHIO—at Parrott.
Address C. Ortman.

OHIO—at Texas.
Address A. G. Anglemy.

OHIO—at Torch.
Address Allen B. Bean.

OHIO—at Stanwood.
Address Albert A. Shilling.

OHIO—at Tobasco.
Address H. W. Jones.

OHIO—at Custar—R. 2.
Address C. M. Smith.

This opportunity said to be an excellent one for sober, industrious general smith.

MONTANA—at Paxton.
Address F. R. Hopkins.

Good opportunity—a homestead waiting for the right man.

NEBRASKA—at Closter.
Address G. A. Sanderson.

NEBRASKA—at Whitney.
Address W. M. Burkitt.

OKLAHOMA—at Mocane
Address Postmaster.

A Sickle Sharpener

H. R. SITLER

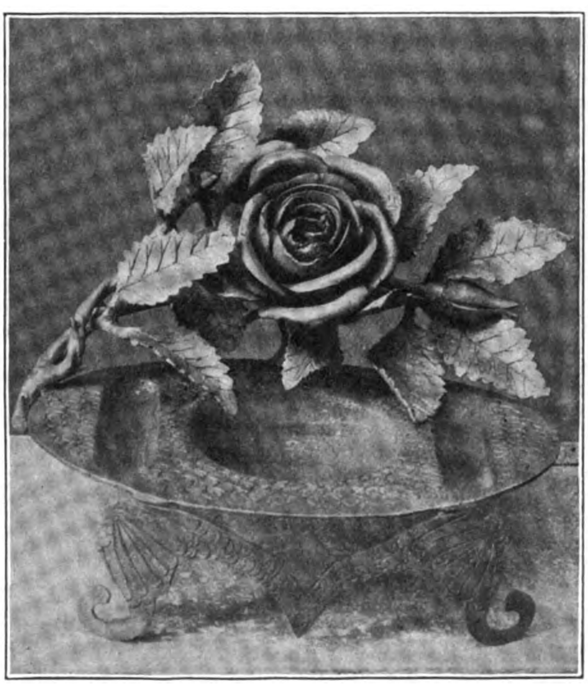
The accompanying engraving shows my sickle sharpener which I, myself, built. It is simple in construction, easily operated if you have power, and can be built at a very small cost. The rod or shaft is 7½ feet long from pulley to grinding wheel. There are four bearings as shown. These bearings can be regulation metal brackets with babbit bearings, but the hardwood serves the purpose in my case. The engraving shows everything so clearly that little or no explanation is necessary.

A board or table is put up at each side of the grinding wheel to support the sickle while grinding. I have found the corundum wheel made by the Chicago Wheel and Manufacturing Company very satisfactory for this work. I use grit 36 and grade C2. There is good money in this work if you go at it right. With this device it is an easy matter to grind a sickle in ten minutes and to do a good and satisfactory job.

An Ornamental Ash Tray

BERT HILLYER

The accompanying engraving shows an ash tray and rose which I forged and am about to send to Mr. James MacNab in Scotland in return for a very neatly made horseshoe and hammer which he sent me a short time ago. Although we never saw one another we became friends through THE AMERICAN BLACKSMITH. In forging this rose and leaves I have found a different method from that which I explained before. The thorns on the stem of the rose can be plainly seen in the photo.



AN ORNAMENTAL ASH TRAY FORGED BY MR. HILLYER

How Do You Charge for Your Work?

Is the method of charging for blacksmith work all wrong or all right? Will a change in method put the trade in a better paying condition?

Here are some questions that deserve thought, discussion and earnest consideration. Their solution may solve the problem of making all of the smith's time worth money and help the smith to get the money for his time.

The plumber, carpenter, tinsmith and numerous other craftsmen when charging for their work make a certain charge for the material used; they figure a profit on handling it and then they charge their time at a certain rate per hour. They get a certain return for all the time spent on a job and make a profit on the material handled.

Why cannot the blacksmith charge for his work in this same way? Why can you not figure a certain profit on the material used in your work? Why can't you get a certain per hour return for all the time you spend on a job?

Consider these questions—look at the matter from all angles—analyze both the present method and the suggested method—and then let us have your ideas on this matter of charging for work. We want a thorough discussion of this matter. What are your ideas on the subject?

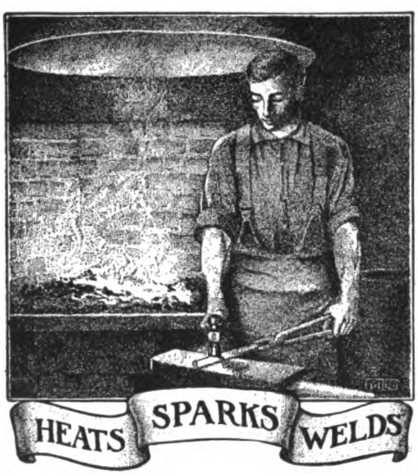
Air Y' Boostin'?

Do y' kno' thur's lots o' people
Settin' round in ev'ry town,
Growlin' like a broody chick'n,
Knockin' ev'ry good thing down?
Don't y' try thet kind o' cluckin',
'Cause it ain't no use on earth.
Y' just be a booster rooster—
Crow an' boost fer all yer worth.

If yer trade needs boostin', boost it—
Don't hold back an' wait t' see
If sum other feller's willin'—
Sail right in, the boostin's free;
No one's got a mortgage on it,
Boostin's free as air an' sky.
If yer trade is shy on boosters,
Y' just boost, an' boost 'er high.

If the trade don't seem ter suit y',
An' the world seems kinder wrong,
What's the matter with yer booster,
Just t' help the trade along?
'Cause if things should stop a-goin'
We'd be in a tarnal plight—
So jest keep yer horn a-blowin',
Boost the trade with all yer might.

If y' kno' the trade's a failin'(?),
Just ferget it, 'cause y' kno'
Thet same trade hes got sum good points,
Them's the ones y' want t' show.
"Cast yer loaves upon the waters,
They'll cum back" 's a sayin' true,
Mebbe, too, they'll cum back buttered,
When the ol' trade boosts fer you.



A gas engine in need is a friend indeed.

Success is failure kicked to pieces by hard work. Keep a-kickin'!

Hans Dillburger says: "A man may dalk like a fool unt yet be wise."

Only a few cents' increase in each job means a big sum at the month's end. Get a fair price for the work you do.

Are you getting your share of harvesting machine work these days? Better get out after it before your competitor wakes up.

Let us hear how you do your work. Every workman doesn't do his work the same way. Explain your way—perhaps it's better.

Do you keep the catalogs you receive? They are useful books of trade. Keep them where you can get them when you want them.

The helper who takes as much interest in the business as the proprietor does is on the road to another shop with his own name over the door.

A mighty good plan is to set aside a certain sum each month for the purchase of new tools and equipment. Try it—you'll find it easier to keep the shop equipment up to date.

What do you do with your spare time? Are you investing it properly? Time is money; but spare time is money invested at 50 per cent and paying a daily dividend. **Are you getting your dividends?**

Don't think it correct even if a job has been done a certain way for ten years. The chap who did it the first time may have been a "botch." Don't be afraid to do your work differently if you can do it better.

Of course you don't agree with everything said in "Our Journal." We don't expect you to. But when you don't, we want to have your side of the story. That's the only way we can learn; and it will help you and the other fellow, too.

One of the most highly prized possessions when once obtained is a full appreciation of the value of each present moment. Also it is one of the hardest things to acquire. But much success lies in this apparently simple matter. Do it now.

The best is none too good—cheap machines are expensive at any price. When you buy, buy good tools made by reliable makers. Better a few tools of first quality than a shopful of third-rate junk. And the best is always cheapest in the end.

Of course we want you to read the advertising pages. If you don't, how can you hope to keep up with the progress of the times? Read them carefully each month and write to the advertisers, too. They can often help you.

Don't forget that you can extend your own subscription account without cost. Just get one new subscriber to "Our Journal"—we will give you six months' credit on your account. Fair, isn't it? Try it today—ask your neighbor.

It's safe to assume that a man who continues to advertise his goods, must make reliable goods. Ever think of it that way? And if you continue your advertising, week after week and year after year, people cannot help but have confidence in you and your ability. Try it.

If honesty pays and advertising pays, honestly advertising honest work should be a big trade-winner. Advertise honestly and then do your work just as advertised. Live up to your advertising and advertise so you can live up. Success and profit will stare you in the face.

The country and nation depend upon agriculture. And agriculture depends upon the smith. The forge and farm go hand in hand. Hammer and anvil, plow and reaper, are the implements of industry in a common cause—the building and developing of the country and nation.

Crying aloud for paint are some of the shops and signs we've seen during the past month. Is yours crying? Better get busy with brush and paint pot while the sign is worth repainting, and the shop will look a hundred per cent better behind a clean, new coat of color.

Just because there's another smith shop across the road from you is no reason why you cannot go on making a fair profit and doing a good business. Come to an understanding with your neighbor. See if you cannot make competition serve you both to advantage.

'Bout time to prod those slow-pay customers again. First-of-the-month statements followed by a weekly letter will help loosen up the money. And when letters fail, a personal call sometimes helps. And again, a lawyer is sometimes necessary. Adapt the method to the needs. But do something.

Better take a vacation while you can and not when you're forced to. And when you take yours take a rest. Don't bustle, bluster and blow at some resort, or sizzle, swelter and sweat at some park. Take the Missus and children to some cool, quiet place and rest. And, if you think twice before you go, it won't cost you very much, either.

Getting business is a puzzling problem, but getting the money after getting the business is sometimes more difficult of solution. The modern smith must be a vigorous business-getter and a tactful money-getter. The same system will not usually work in both cases. Sometimes it is necessary to reverse tactics.

It's well to be cautious—but too much caution may get in the way of advancement. Some folks—Tom Tardy for example—are so afraid of new things that they go through life in a rut. There is no harm in trying new things, but use common sense when about to try something new. This Friend Tardy fails to do.

A true balance of work and play is the only sure means of getting all there is to life. An overworked man uses up energy that belongs to the future, and sooner or later he will find himself mentally or physically bankrupt. On the other hand the man who idles never develops his true capacity and must admit his failure to make the best of his opportunities.

The Boston Workhorse Parade Association publishes the following hot-weather rules:

1.—Load lightly, and drive slowly.

2.—Stop in the shade if possible.

3.—Water your horse as often as possible. So long as a horse is working, water in moderate quantities will not hurt him. But let him drink only a few swallows if he is going to stand still.

4.—When he comes in after work, sponge of the harness marks and sweat, his eyes, his nose and mouth, and the dock. Wash his feet but not his legs.

5.—If the thermometer is 75 degrees or higher, wipe him all over with a wet sponge. Use vinegar water if possible. Do not turn the hose on him.

6.—Saturday night, give a bran mash, cold; and add a tablespoonful of saltpetre.

7.—Do not use a horse hat, unless it is a canopy-top hat. The ordinary bell-shaped hat does more harm than good.

8.—A sponge on top of the head, or even a cloth, is good if kept wet. If dry it is worse than nothing.

9.—If the horse is overcome by heat, get him into the shade, remove harness and bridle, wash out his mouth, sponge him all over, shower his legs and give him four ounces of aromatic spirits of ammonia, or two ounces of sweet spirits of nitre, in a pint of water, or give him a pint of coffee, warm. Cool his head at once, using cold water, or, if necessary, chopped ice, wrapped in a cloth.

10.—If the horse is off his feed, try him with two quarts of oats mixed with bran and a little water; and add a little salt or sugar. Or give him oatmeal gruel or barley water to drink.

11.—Watch your horse. If he stops sweating suddenly, or if he breathes short and quick, or if his ears droop, or if he stands with his legs braced sideways, he is in danger of a heat or sunstroke and needs attention at once.

12.—If it is so hot that the horse sweats in the stable at night, tie him outside. Unless he cools off during the night he cannot well stand the next day's heat.

Our Honor Roll

TWENTY-EIGHT

NEW NAMES ADDED THIS MONTH

Twenty-eight new names added, and three of those twenty-eight go into the 1922 class. Louisa Carriage Wks., of Virginia, Mr. Haar of Louisiana and Mr. Dillon of Nevada have taken advantage of our long-time offer to place their names up in the 1922 class. Why not follow their lead? If your subscription account expires this month of August send a remittance of $5.00 ($7.00 if you live in Canada; 1 £. 14 s. if you live in Great Britain, South Africa or Australia) and get your name in the class of 1922. You see the tail-enders are being taken off each month on account of the additions to the body of this list.

If you are a tail-ender send in a five-spot and get up in the lead. If your subscription is paid to the first part of 1915 you'll not be on Our Honor Roll very long, but if you send in a five-spot (or $7.00 or 1 £. 14 s.) you place your name right up among the leaders. Your name in the 1925 class will look good.

Don't say you can't afford it. You will save money on your subscription, and everyone can afford to save money. And that is our reason for this Honor Roll and the long-time rates—it enables us to make a very material reduction in the price of the paper and TO SAVE YOU SOME REAL MONEY. Think it over and then ACT.

	U. S. and Mexico	Canada	Other Countries
Two years	$1.60	$2.00	10 shillings.
Three years	2.00	2.70	14 shillings.
Four years	2.50	3.20	18 shillings.
Five years	3.00	3.75	1 pound.
Ten years	5.00	7.00	1 pound 14s.

And then, too, you can gain a place on Our Honor Roll by getting new subscribers. Just show this big list of honor readers to your brother craftsmen. A paper must be pretty good to get a practical man's subscription years and years in advance. Then send in the new subscription orders and we will give you six months' credit on your own account for each new order you send us. That will help you toward an honor place. Will you tell your neighbor?

NAME	Subscription Paid to
W. C. Watt, Kan	Dec., 1930
I. J. Stites, N. J.	Jan., 1928
W. R. Turner, Man	Oct., 1923
T. Bradley, N. S. Wales	Mar., 1923
W. Lawson, N. Z.	Nov., 1922
A. Pfeiffer, Ohio	Aug., 1922
Louisa Carriage Wks., Va.	May, 1922
S. Smith, Tex	Apr., 1922
J. W. Haar, La	Mar., 1922
E. A. Dillon, Nev	Mar., 1922
D. W. Smith, R. I	Mar., 1922
D. F. Kuster, Wash	Mar., 1922
R. H. Keith, Ia	Jan., 1922
O. M. Johnson, Minn	Oct., 1921
H. Feldus, Neb	Sept., 1921
W. K. Kline, Kan	May, 1921
R. S. Crisler, Ky	Jan., 1920
I. M. Townsend, Cal	Apr., 1919
C. Williams, W. Aus	Mar., 1919
T. P. Considine, Mass	Dec., 1918
Richard Brenner, Tex	Feb., 1918
W. F. Hill, N. C.	Feb., 1918
P. J. Dally, W. Aus	Jan., 1918
J. Morrow, Pa	Jan., 1918
Mess Bros., Vict	Dec., 1917
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, N. Dak.	Nov., 1917
W. C. Roney, Pa	Oct., 1917
J. N. Miles, Ky	Oct., 1917
H. Ferrel, Ill	Aug., 1917
J. McMeeken, N. Z.	Aug., 1917
F. H. Gierke, S. Aus	Aug., 1917
V J. Hubbard, N. Y.	July, 1917
J. H. Bakeberg, S. Africa	June, 1917
A. R. Hallenbeck, N. Y.	June, 1917
F. C. Bock, Neb	June, 1917
Yost & Halvorson, Minn	May, 1917
W. McCoy, Kan	May, 1917
A. Guettler, Tex	May, 1917
C. F. J. Lorenz, N. Y.	May, 1917
A. Datwyler, Ohio	May, 1917
E. Thibaudeau, Wis	Apr., 1917
W. Pickering, S. Africa	Apr., 1917
Ed. Burrows, England	Apr., 1917
L. Kausch, Wis	Apr., 1917
J. M. Brown, Texas	Apr., 1917
J. C. Woods, W. Aus	Mar., 1917
C. Boulton, N. S. Wales	Mar., 1917
C. A. Hawkins, Ore	Mar., 1917
A. L. Monycott, W. Va	Mar., 1917
J. Peterson, Ia	Mar., 1917
J. Anderson, Tas	Mar., 1917
A. J. Neill, Vt	Mar., 1917
Ed. Deitrich, Ind	Mar., 1917

NAME	Subscription Paid to
Lewis Chase, N. Y	Mar., 1917
E. O. Lee, S. Dak	Mar., 1917
S. Stemple, Ohio	Mar., 1917
R. S. Gugisberg, Kan	Mar., 1917
J. S. Haskell, Col	Mar., 1917
W. L. Roark, Tex	Mar., 1917
A. R. Barlow, Texas	Mar., 1917
C. A. Whitacre, Ohio	Mar., 1917
B. P. Carney, Ill	Mar., 1917
H. Schnette, Ill	Feb., 1917
E. Doughman, Ohio	Feb., 1917
J. W. Haught, Ill	Feb., 1917
Chas. F. Giese, N. Mex	Feb., 1917
M. E. Goller, Pa	Feb., 1917
J. Potthoff, Neb	Feb., 1917
G. M. Garety, Mich	Feb., 1917
Ernest Finley, Pa	Feb., 1917
A. Tillman, Cal	Feb., 1917
Walker Bros., N. Z.	Feb., 1917
G. W. Whittington, W. Va.	Feb., 1917
J. H. Hoyle, S. Africa	Feb., 1917
Irving Bros., N. Y.	Feb., 1917
F. Roschy, Pa	Feb., 1917
August Millet, Ill	Feb., 1917
C. P. Robertson, S. Africa	Feb. 1917
G. A. Gurley, Ore	Jan., 1917
F. K. Wade, Me	Jan., 1917
L. V. Senn, Neb	Jan., 1917
S. H. Austin, N. Y	Jan., 1917
H. Kahl, Ia	Jan., 1917
J. H. Bergen, Kan	Jan., 1917
F. G. A. Williams, S. Aus.	Jan., 1917
H. Grimm, Utah	Dec., 1916
A. H. Gooding, S. Aus	Dec., 1916
Leonard Smith, N. J	Dec., 1916
C. F. Shaw, Man	Dec., 1916
W. Elward, Pa	Dec., 1916
W. W. Egly, Pa	Dec., 1916
Jos. Boyer, Mich	Dec., 1916
J. Williams, N. S. Wales.	Dec., 1916
J. H. W. Schneider, Cal	Dec., 1916
W Sauer, Minn	Dec., 1916
F. F. Darling, Cal	Dec., 1916
Chas. Newland, Cal	Dec., 1916
J. T. Brahm, Ia	Dec., 1916
P. H. St. Louis, Wis	Dec., 1916
A. E. Nickols, Okla	Dec., 1916
C. J. Hall, Wash	Dec., 1916
Bob Fricke, Ala	Dec., 1916
Joeris Bros., Tex	Dec., 1916
R. Clemens, Conn	Dec., 1916
Scheffley & Schmitt, Pa.	Dec., 1916
A. Brauer, Ohio	Dec., 1916

NAME	Subscription Paid to
J E. Beatty, Mo	Dec., 1916
Geo. Cassie, Scotland	Dec., 1916
John Kain, Ky	Dec., 1916
F. W. Howell, Ill	Dec., 1916
Tom Nolan, S. Aus	Nov., 1916
H. J. French, N. Z	Nov., 1916
F. N. Browning & Son, Ky.	Nov., 1916
J. Macuab, Scotland	Nov., 1916
P. Gessen, Ill	Nov., 1916
J. W. Gribble, S. Aus	Nov., 1916
W. G. Sim, N. Z	Nov., 1916
H. V. Ruehl, Ala	Nov., 1916
G. Lindborg, Ind	Nov., 1916
Pittman Stell, N. C	Nov., 1916
J. S. Finkenbiner, Ind	Nov., 1916
R. D. Wixom, N. Y	Nov., 1916
E. A. Knapp, N. Z	Oct., 1916
T. J. Haskins, N. S. W	Oct., 1916
Lothian & Skinner, N. S. W.	Oct., 1916
W. B. Knouff, Ala	Oct., 1916
Gorham Bros., Ia	Oct., 1916
W. H. F. Brauch, N. C	Oct., 1916
Clark Olds & Co., Neb	Oct., 1916
Irwin Scott, N. Y	Oct., 1916
C. E. Durham, Kan	Oct., 1916
M. Ringo, S. Africa	Oct., 1916
W. Delley, Queens, Aus	Oct., 1916
J. J. Iler, N. S. Wales	Sept., 1916
James Poettgen & Co., Mo.	Sept., 1916
Jno. Goettinger, Ia	Sept., 1916
Geo. Fleckenstein, Cal	Sept, 1916
Geo Hill, Aus	Sept., 1916
E. C. Beard, Aus	Sept., 1916
J. K. Glinicki, Mich	Sept., 1916
Oscar Buhner, Md	Sept., 1916
A. J. Hammond, Cal	Sept., 1916
Robert Murray, Cal	Sept., 1916
D. E. Wright, Pa	Sept., 1916
J. S. Haskell, Col	Sept., 1916
R. Sommer, Aus	Sept., 1916
J. A. Sequin, Can	Aug., 1916
James Clarke, Jr., Aus	Aug., 1916
Dispatch Fdy. Ltd., N. Z	Aug., 1916
J. W. Fowler, N. Z	July, 1916
A. C. Lodwig, Cal	July, 1916
A. A. Bahlke, Mich	July, 1916
J. K. Hansen, Aus	July, 1916
J. B. Barker, Ill	July, 1916
H. M. Larsen, Wis	July, 1916
Geo. P. MacIntyre, Me.	July, 1916
Jas. A. Buchner, Mich	July, 1916
H. M. Fingar, N. Y	July, 1916
L. H. Strange, Vict	July, 1916
P. O'Donnell, Vict	July, 1916
R. J. Hancock, N. Z	July, 1916
F. G. Wilson, Colo	July, 1916
J. Chalmers, S. Africa	June, 1916
G. R. Harrison, Aus	June, 1916
J. Waycich, S. Africa	June, 1916
W. Voight, S. Africa	June, 1916
Martin Jensen, Wis	June, 1916
Chester Humbert, Wis	June, 1916
Lincoln Underhill, Cal	June, 1916
M. Broton, N. Dak	June, 1916
Hans Eriksen, Ill	June, 1916
C. Morrell, N. Brunswick.	June, 1916
J. O. Conrad, Kan	June, 1916
Adam Schmitt, Mich	June, 1916
James Sinclair, W. Aus	May, 1916
H. Baker, Aus	May, 1916
E. Q. Krehbiel, Kan	May, 1916
C. H. Cairns, N. Y	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vt	May, 1916
C. A. Stebbins, Kan	May, 1916
Sanford Baker, Mo	May, 1916
E. B. Anderberg, Ill	May, 1916
Kelliher Bros., W. Aus	Apr., 1916
P. A. Peterson, Ia	Apr., 1916
G. F. Bowers, Okla	Apr., 1916
D. E. McDonald, Fla	Apr., 1916
James Baxter, S. Africa	Apr., 1916
E. P. Dignan, S. Aus	Apr., 1916
W. H. Winget, Vt.	Apr., 1916
C. Schmid, Neb	Mar., 1916
A. Rockenschup & Son, La.	Mar., 1916
C. H. Alexander, N. Y	Mar., 1916
A. M. Harebo, Wis	Mar., 1916
George Howard, Kan	Mar., 1916
G. N. Follmar, Neb	Mar., 1916
W. Willoughby, Mich	Mar., 1916
H. Hoffmeyer, N. J	Mar., 1916
Frank L. Locke, N. Y	Mar., 1916
Frank L. Evarts, Conn	Mar., 1916
C. R. Winget, Vt.	Mar., 1916
H. & J. Chisholm, N. Z	Mar., 1916
C. F. Molkenten, Aus	Mar., 1916
H. D. Phillips, S. Aus.	Mar., 1916
J. B. Fry, Wash	Mar., 1916
L. A. Downing, Cal	Mar., 1916
A. A. Schreiber, Tex	Feb., 1916
J. T. Dillard, Tex	Feb., 1916
F. J. Flessel, N. Y	Feb., 1916
E. P. Jones, Kan	Feb., 1916
E. J. Bishop, N. Y	Feb., 1916
J. N. Tyler, Ohio	Feb., 1916
Chas. H. Kern, Ill	Jan., 1916
J. H. Ecroyd, Cal	Jan., 1916
Thomas Horne, Ariz	Jan., 1916
Charles Tucker, Mich	Jan., 1916
M. Klitgord, N. Y	Jan., 1916
O. Stenning, S. Dak	Jan., 1916
Iver Johnson Arms and Cycle Works, Mass	Jan., 1916
Feldmeyer & Schaake, Kan	Jan., 1916
Chas. Winter. Cal	Dec., 1915
E. J. Bufe, Ia	Dec., 1915

NAME	Subscription Paid to
Geo. Sykes, Aus	Dec., 1915
W. Patrick, N. Y	Dec., 1915
Jas. A. Sharp, Mass	Dec., 1915
J. Krahulec, Ill	Dec., 1915
P. E. Dahlfurst, Cal	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Neb	Dec., 1915
G. S. Fisher, Neb	Dec., 1915
Printers Supply Company, Neb	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Va.	Dec., 1915
C. J. Ash, Kan	Dec., 1915
F. H. Joslin, Mass	Dec., 1915
C. W. Ames, Mass	Dec., 1915
C. L. Sorensen, Neb	Dec., 1915
E. Williams, N. Y	Dec., 1915
W. Urquhart, N. Z	Dec., 1915
W. Rupe, Kan	Dec., 1915
L. S. Kocher, Ia	Dec., 1915
P. W. Frazer, N. Z	Dec., 1915
J. F. Shimanek, Md	Dec., 1915
J. MacClure & Son, N. Z.,	Dec., 1915
J. P. Carrick, Ind	Nov., 1915
D. Codere, Ill	Nov., 1915
F. S. Woody, Ia	Nov., 1915
George H. Ilsley, Mass	Nov., 1915
M. I. Huff, Mo	Nov., 1915
Stephen Wachter, Pa	Nov., 1915
C. J. Willard, Ill	Nov., 1915
J. S. Lee, Wash	Nov., 1915
L. P. Mortensen, Mich	Nov., 1915
R. L. Whitfield, N. S. W	Nov., 1915
W. Foulkes, England	Oct., 1915
N. W. Hammond, Col	Oct., 1915
P. G. Dairdson, N. Dak	Oct., 1915
C. N. Mills, Cal	Oct., 1915
H. Dier, S. Aus	Oct., 1915
S. B. Goodsell, Conn	Oct., 1915
D. F. Hallowell, Ia	Oct., 1915
A. Roth, Ill	Oct., 1915
C. C. Perry, Aus	Oct., 1915
Sidney Stevens Imp. Co., U.	Oct., 1915
W. H. Findlay, N. Z	Oct., 1915
R. F. Watson, Cal	Oct., 1915
H. R. Stone, Conn	Oct., 1915
F. Teuber, Ga	Oct., 1915
S. W. Winch, Vt	Sept., 1915
Ed. Hammill, Cal	Sept., 1915
R. D. Simkins, Pa	Sept., 1915
T. J. Reynolds, Pa	Sept., 1915
Wm. Bates, Tex	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, W. Va	Sept., 1915
Hugh L. Lynn, Ky	Sept., 1915
Advance Blacksmith Co., Mo	Aug., 1915
A. Chargois, Queens'd, Aus.	Aug., 1915
A. M. Byfield, W. Aus	Aug., 1915
C. E. Allen, Neb	Aug., 1915
M. J. Roder, Mont	Aug., 1915
J. E. Lyon, Tex	Aug., 1915
F. W. Krenz, Cal	Aug., 1915
J. W. Storment, Ill	Aug., 1915
Jos. P. Rotolinski, Mass	Aug., 1915
T. O. Chittenden, N. Z	July, 1915
The Goldfields Diamond Drilling Co., Aus	July, 1915
J. A. Lawton & Sons, S. Aus.	July, 1915
W. C. Jones, N. C	July, 1915
J. Picotte, Yukon Ter	July, 1915
George M. Ferree, Ut	July, 1915
T. S. Finnigan, Vic., Aus	July, 1915
R L. Parker, Ohio	July, 1915
J. Manly, Aus	July, 1915
G. Sundberg, Wash	June, 1915
I. F. & F. A. Stewart, Ohio.	June, 1915
C. F. Seiffert, Texas	June, 1915
S. A. Stilles, Ohio	June, 1915
E. L. Herring, Fla	June, 1915
G. R. Twedell, Miss	June, 1915
H. P. Houghton, Ill	June, 1915
J. W. Ivie, Ut	June, 1915
A. B. Jardine & Co., Ont.	June, 1915
L. Martin, Texas	June, 1915
John Payne, Col	June, 1915
M. J. Coughlin, Ill	June, 1915
J. K. Crawford, N. Z	June, 1915
F. W. Schlein, Ga	June, 1915
H. Deifenbaker, Ill	May, 1915
F. J. Wurtz, Neb	May, 1915
E. C. Cullers, Va	May, 1915
W. Leihsing, Okla	May, 1915
J. Smith, N. Y	May, 1915
Harry Ham, Kans	May, 1915
J. A. Miller, S. Dak	May, 1915
B A. Parker, Ga	May, 1915
J. C. Klein, Miss	May, 1915
N. B. Demarret, N. J	May, 1915
E. E. Mercer, Kan	May, 1915
Schintgen & Maier, Minn.	May, 1915
A. E. Spangberg, Ore	May, 1915
W. S. Helmecke, Tex	May, 1915
F. F. Putnam, Pa	May, 1915
Otto Siebler, Tex	May, 1915
W. A. Matson, Ut	May, 1915
C. A. Nelson, Ind	Apr., 1915
Sam Leclair, Vt	Apr., 1915
R. Roberts, S. Africa	Apr., 1915
Otto Tietz, S. Africa	Apr., 1915
H. C. Adams, Ind	Apr., 1915
F. J. Eckert, Pa	Apr., 1915
A. Seewale, Ill	Apr., 1915
E. N. Harris, N. Y	Apr., 1915
W. L. Whitebread, Aus	Apr., 1915
I. P. Chiappa, Bermuda Is.	Apr., 1915
C. Isaacs, Cal	Apr., 1915

Ten Questions for the Month

The questions this month are on iron and steel—the various kinds. There are terms used very frequently, we believe, by the average smith that he thinks he knows all about, but when asked to explain the term or terms used he is in much the same plight as the would-be wheelwright who in answer to a question as to the meaning of "gather," replied: "It is something which is brought together." So read the questions carefully—none are unfamiliar to you. Can you explain their meaning so a person who is not a steel worker or blacksmith will understand?

1.—What is Harveyized armor plate?

2.—What is carbon steel?

3.—What is Tungsten steel? vanadium steel?

4.—What is charcoal iron?

5.—What is high-speed steel?

6.—What is an ingot?

7.—What is expanded metal?

8.—What is the meaning of "heat treatment" as now used in connection with steel?

9.—What is meant by "physic" or "physicking" in connection with the manufacture of iron and steel?

10.—What is fire clay?

Answers to Questions in July Issue

1.—Take the inside diameter of the ring, add to it the thickness of the stock that is to be used, then multiply by 22 and divide by 7.

A ring is to be made 22 inches outside diameter and to measure 3 inches on face, inside diameter to be 20 inches. The stock will measure 1 by 3 inches. To follow the rule, we take 20 inches and add to it 1 inch, giving us 21 inches. This multiplied by 22 gives us 462; and 462 divided by 7 gives us just 66 inches—the length of stock required for the ring.

2.—Take the inside diameter of the ring, add to it twice the thickness of the stock across the corner or angle, then multiply by 22 and divide by 7.

A ring is to be formed from angle iron, with 3-inch legs, ½ inch thick, and to measure 36 inches inside diameter. The corner of this stock will be found about 1 inch in thickness. So we take twice the thickness, or 2 inches, add it to the inside diameter, or 36 inches, and get 38 inches. Twenty-two times 38 inches equals 836; and 836 divided by 7 gives us 119$\frac{3}{7}$ inches, or 9 feet 11$\frac{3}{7}$ inches—length of stock required.

3.—Take the outside diameter of the ring, subtract twice the thickness of the stock across the corner or angle, then multiply by 22 and divide by 7.

4.—Add the greatest length to the greatest breadth and divide by 2. Then add the thickness of the stock, multiply by 22 and divide by 7.

A link is to be made of 1-inch stock and is to measure 5 inches long by 3 inches wide, inside. Adding the dimensions of the stock gives us 8 inches; dividing by 2 gives us 4 inches. Four plus the thickness of stock gives us 5 inches. This multiplied by 22 equals 110 and divided by 7 gives us 15¾ inches—length of stock required.

5.—The rule is: divide the volume of the finished piece or the required piece by the sectional area of the given stock, and the result is the length to cut.

For example: how long a piece of 1½-inch round stock will it take to upset to 2¼ inches in diameter and 1 inch thick? To find the volume of the finished piece we multiply 2¼ x 2¼ x 1, giving us 5$\frac{1}{16}$. The sectional area of the given piece is found by multiplying 1½ x 1½, giving us 2¼. Dividing 5$\frac{1}{16}$ x 2¼ gives us 2¼ inches—the length of 1½-inch round stock required.

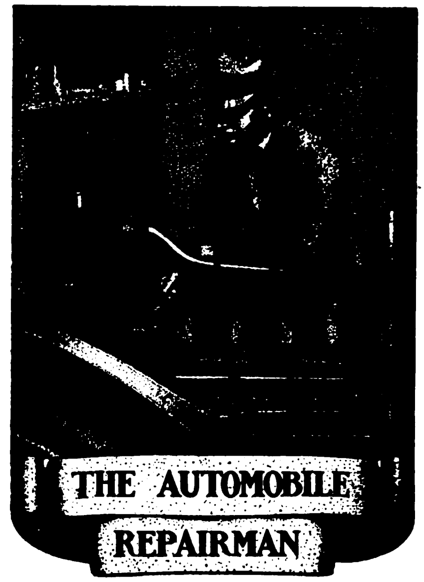
6.—To find the weight of a forging, find the volume of the forging in cubic inches, if small, and in cubic feet, if large, and multiply by the weight of the material per cubic inch or foot, the weight of the material of which the forging is made being known.

7.—Cast iron weighs 450 pounds per cubic foot, while steel weighs 490 pounds per cubic foot.

8.—A medium tire will expand about $\frac{3}{16}$ of an inch per foot of length.

9.—A circumferentor or measuring wheel is a wheel or large disc mounted in a handle and fitted with a pointer, and is used for measuring stock.

10.—First lay out the work full size just as it is to appear, then draw a line through the center of the curves, scrolls and all parts of the drawing. Now take a piece of soft wire and lay it on the center, following all curves and shapes, until all have been traced. Now straighten the wire and its length will give you the length of stock required.



The Rotary Valve Motor

Most of our readers are quite familiar with the poppet valve type of internal combustion motor, but the rotary valve motor is comparatively new. In reprinting the following descriptions of three rotary valve motor designs now on the market we do so for the purpose of keeping readers in touch with the new developments in automobile motors. The descriptions and engravings are reprinted from *The Automobile Journal*. They should give our readers an excellent idea and a good understanding of these motors which promise to overcome many of the so-called faults in the poppet valve type.

Reynolds' Rotary Valve Motor

Fig. 1 presents the six-cylinder unit partially assembled, but with the cover plate and master gearing removed to illustrate the principal difference between its construction and that of the four-cylinder design, which is indicated in Fig. 3. In this latter it will be noted that the master gear is located in a separate housing at the end of the train which operates the individual valves in the respective cylinder heads. In the six this master gear is located in a separate compartment in the center, between each set of three cylinders. This is the principal distinction between the two models, but it will be necessary to describe the features of the Reynolds' Rotary Valve in more detail

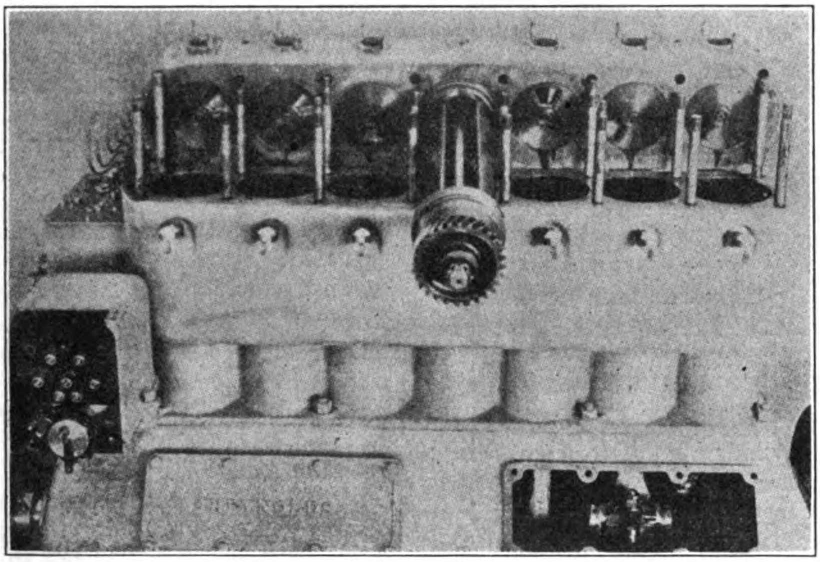


FIG. 1—SHOWING THE REYNOLD'S MOTOR PARTIALLY ASSEMBLED

before considering the effect of this change upon the working of the motor. The valve itself is seen in Fig. 3 between the two main views of the cylinder head assembly. The view at the right is that presented by looking into the cylinders, and in the one nearest to the master driving gear the valve has been removed to show the construction of the cylinder head. It will be noted that there are two ports in the cylinder head and only one in the valve. The exhaust is so constructed that it remains open about 14 per cent longer than the inlet; providing for complete scavenging of the cylinder during the exhaust stroke of the piston.

Reynolds' Valve Disc

In the Reynolds' Motor the pistons are the only reciprocating parts. The valve discs are in effect sliding members, except that they rotate on top of the cylinder head, their ports registering with inlet and exhaust

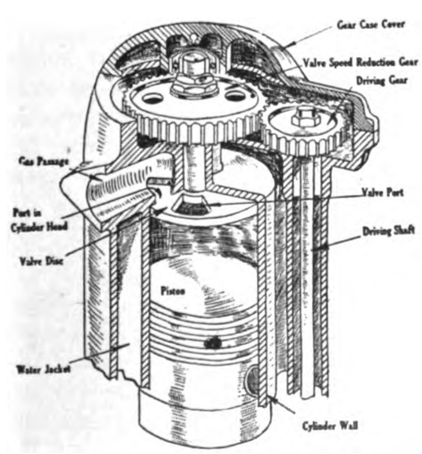


FIG 2—SHOWING DETAIL OF CYLINDER MECHANISM

openings in these members. After careful experimentation the maker has constructed the discs of a special bronze composition, and it is claimed that extended use has demonstrated that the amount of wear is so slight as to be possible of detection only with a micrometer.

These valves are .0625 inch less in diameter than the bore of the cylinder, so that in an engine of 3.5-inch bore, for instance, the valves are 3.4375 inches diameter, .5 inch thick and with a stem .75 inch diameter. The stems are formed integral with the discs. Operation is at one half speed, and the timing and order of firing may be arranged to suit the various individual needs.

Broached in the bronze disc is a triangular hole or port, opening approximately one square inch. Formed in the cylinder head are two ports, also triangular in shape. The action of the valves is through a train of spiral steel gears .875-inch face, and carried in a recess on top of the cylinders. This construction is brought out more clearly at the left of Fig. 3.

Operating Gears

To the .75-inch stem of each of the four or six valves is keyed one of these spiral gears, so that all valve stem gears are in mesh. Primary action is from a steel spiral gear keyed to the crankshaft; this meshing with a bronze gear keyed to the hub of another steel spiral gear on the .75-inch transverse shaft. This latter steel gear meshes with a bronze spirally cut member at the base of the .75-inch vertical shaft, fitted at the bottom with a thrust bearing. This shaft is carried in an integral housing at the end of the cylinder casting in the four-cylinder models, as outlined at Fig. 3, but in a central dummy cylinder in the six, as noted in Fig. 1.

At the upper end of this vertical shaft is a spiral gear which meshes with the first of the four gears in the four-cylinder unit, imparting a continuous rotary movement to the valve discs. In the six, the top of the vertical shaft carries a helical gear which actuates three gears each way, thus serving to rotate the six valves on their seats. This central placing of the driving gear is held to balance the drive and minimize back lash. The design has been so worked out that the Reynolds' Six can be delivered to run permanently in either direction as desired.

The valve stems being bronze, virtually supply their own bearing surfaces, working on the cast iron of the cylinder heads. All valve gears are secured through lock nuts, and

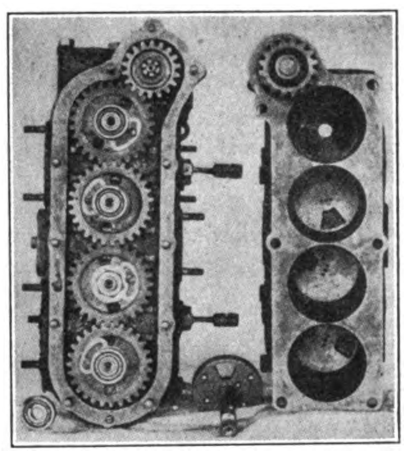


FIG. 3—SHOWS THE FOUR-CYLINDER MOTOR

with these in place enough space exists to support imported ball bearings on the valve stems, these recessing in the aluminum cover plate when it is bolted in position. Adjustment of the stems is such that a smooth rotation is provided without undue wear. Since the valve never leaves its seat there is held to be slight accumulation of carbon, and this is cared for by countersunk holes in the top face of the valve which also serve as oil receptacles. Careful study of Fig. 1 will reveal the oil leads to the various gears from which the lubricant finds its way to the valve discs.

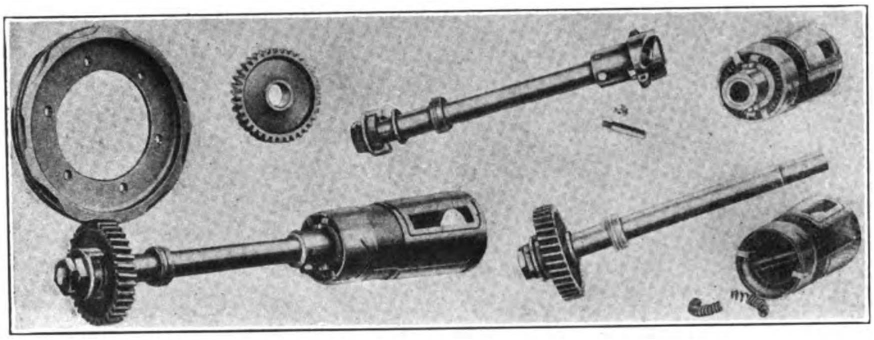


FIG. 4—SHOWS THE PARTS OF THE SILENT VALVE MOTOR VALVE MECHANISM

The Four Cycles

Fig. 2 will serve to illustrate the cycle of operation; this being a cutout section through one of the cylinders with the valve disc exposed. It will be seen that the triangular port in the disc is registering with the inlet port of the cylinder head and the piston is on its way down on the suction stroke. By the time the piston has reached the bottom of its stroke a full charge of gas has been drawn into the cylinder. The opening in the disc has then passed by the inlet port in the cylinder head and there is no opening at the top of the cylinder during the compression and power strokes. When the piston reaches the bottom of its travel on this latter the opening in the valve begins to register with the exhaust port in the cylinder head, not shown in the drawing, and scavenging commences.

Materials Employed

Pistons like the cylinders are cast of fine grade of gray iron. These are fitted with four .25-inch compression rings, cast separately, turned on the outer faces, ground on the edges and untouched on the inner faces. This means that the scale on the inner faces is not removed; it being the opinion of the designers that to do so effects a loss in the natural elasticity of the rings. The bottom ring groove shoulder is beveled at 45 degrees for the purpose of scraping the oil descending the cylinder walls and forcing it through holes drilled in the piston and thence to the bottom of the crankcase.

Among the other features incorporated in the design of the six-cylinder model is the provision for accessibility. The gearcase cover is removable from the head to permit of simple adjustment of the valves. The head is removable from the cylinder casting, as shown herewith. The cylinders may be removed from the base and the upper half of the base may be separated from the lower half; leaving the crankshaft, pistons and rods undisturbed if desired. More than this, removable plates are provided on both sides of the crankcase, and these are of such generous size that a bearing can be replaced easily, should this become necessary, without taking down any part of the motor.

Silent Valve Motor

The Silent Valve Company of America, Connersville, Ind., has brought out the Silent Valve Motor,

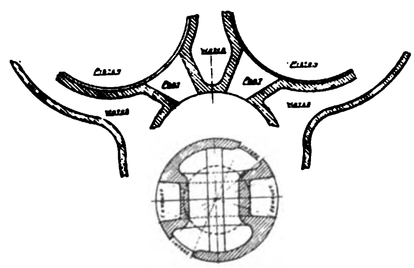


FIG. 5—SHOWING VALVE IN PLACE BETWEEN TWO CYLINDERS

designed by E. L. Russel while engaged as a district manager for the Bell Telephone Company at Dallas, Texas, in 1899. He worked on the principles involved for some ten years before he was rewarded with anything in the nature of success, but for the past two years the motor has been taking on its present form until the company offers what it believes is a thoroughly tested automobile engine of the rotary valve type.

The motor is shown in accompanying illustrations as offered to the public in the four-cylinder form, with bore of 4.5 inches and stroke of 5.5. Fig. 6 shows a view of the motor from the bottom with the valve actuating gears, and it will be noted that each valve serves for a pair of cylinders. Fig. 4 presents the valve and actuating mechanism assembled and completely dismantled. The valve is geared one quarter crankshaft speed, and its periphery is so constructed as to provide suitable inlet and exhaust ports to carry each of the cylinders through four cycles. This is accomplished once each half revolution of the valve, as this is provided with two inlet and two exhaust ports.

It will be seen that the valve is made conical or tapered; the purpose being to provide means for adjusting it to and from the seat as may be required in order to compensate for variation in the size of the valve and seat, due to heat and wear. The incoming gas enters through the valve cover to the center, thence through the inlet port of the valve which registers with the cylinder port. Following the compression and expansion of the charge the burnt gas finds its way out through the exhaust port or the passage which extends through the center of the valve, and which when registering with the cylinder port also registers with the exhaust side of the valve seat. Fig. 7 gives two sectional views of the valve itself and still further brings out its construction.

In order to accomplish its functions automatically the valve is provided with a peculiar and special actuating means which may be described as follows: The lower end of the valve is constructed so that in combination with a suitably arranged pin and rollers it serves the function of a nut by means of which it is drawn down positively onto the valve seat; since the rollers are made to engage a double spiral grooved collar or yoke member which is assembled on the upper end of the valve shaft.

This spiral grooved collar is fitted with two lugs and two pins located in their centers. These lugs are engaged by two compression springs which also engage two posts or bosses forming a part of the construction on the lower end of the valve. It is apparent that the valve is drawn

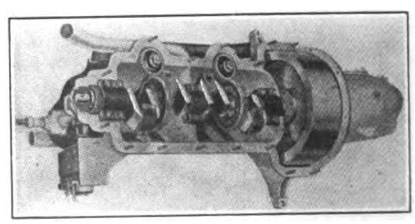


FIG. 6—SHOWS THE SILENT MOTOR FROM THE BOTTOM

into its seat by means of the spiral grooved collar and the torque exerted by the springs around the axis of the valve and, further, that the valve cannot move axially on its seat without rotating the valve shaft, as it is literally screwed onto this shaft. Consequently it cannot be forced from the seat through pressure from the cylinder exerted over the projected area of the ports.

Operation of Mechanism

The operation of the valve-actuating mechanism in driving forward is as follows: The valve as described is too tight on the seat to allow free rotation. However, on turning the engine over, the valve shaft travels ahead of the valve a fraction of a degree; consequently, the spiral grooved collar lifts the valve by means of upward thrust of the collar against the rollers. After the engine is started, the valve naturally increases in diameter, from expansion due to the heat of the engine, thereby momentarily causing it to run tighter on the seat. As soon, however, as the torque or turning effort of the valve increases the slightest amount the spiral grooved collar travels in advance of the valve a fraction of a degree, thereby raising the valve to a higher running level and easing it on its seat.

When the load of the engine is reduced and the temperature of the valve becomes less intense the latter returns to the lower running level, since it contracts and becomes smaller in diameter. The action of the valve is thus described as automatic under all conditions of temperature and it runs within a fraction of a thousandth of an inch of the seat at all times, or as close as the thickness of the lubricant will permit. The wear of the valve and the valve seat is automatically compensated for through the same means which adjusts the valve for variation of temperature.

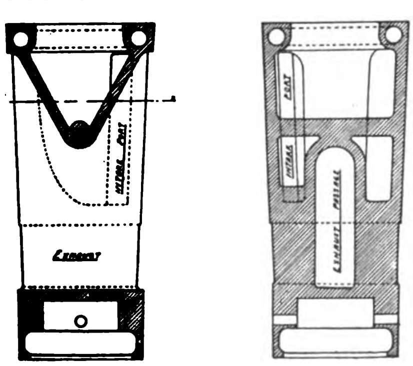


FIG. 7—SHOWING DETAIL OF VALVE

What is termed a reverse drive cam is assembled with the spiral grooved collar and the valve drive yoke; this serving the function of lifting the valve slightly during the backward rotation of the engine. Otherwise, the valve would be jammed on the seat; owing to the screw action of the collar. This reverse drive cam and the valve drive yoke move positively with the valve shaft, as they are rigidly fastened to the shaft by means of a taper pin. The spiral grooved collar, however, only moves positively with the valve shaft during the forward rotation of the engine, as it is driven by means of lugs or wings on the sides of the valve driver which engages studs or pins located in the lower side of the collar. It will thus be seen that the forward drive yoke remains inactive when the engine rocks back and that at such time the reverse drive cam becomes operative in performing the function for which it was designed.

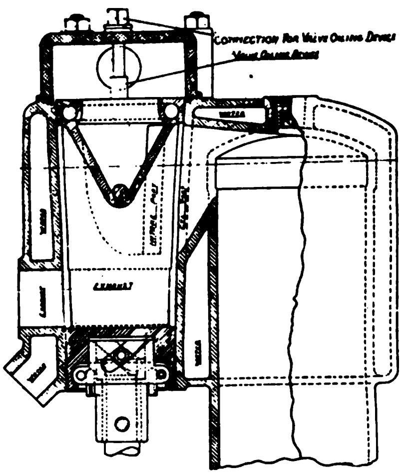


FIG. 8—THE VALVE AND ITS RELATIVE POSITION TO CYLINDER

Interior of Valve

Having reference to Fig. 4: The driving mechanism is contained within the cylindrical base. The exhaust passage goes straight through the valve. The inlet opening is through the top, is separated from the exhaust port by suitable walls and opens into the inlet valve ports. Oil grooves are provided on the sides as indicated and these communicate with a small hole in the top which registers with the oil supply pipe once each revolution. There is a decided suction in the inlet port which draws the oil from the upper groove and distributes it over the whole length of the valve seat and its face.

Fig. 8 shows a section through the cylinder and valve with the latter in position on the inlet stroke. The charge may now enter over the top of the valve and through the inlet port. By reference to the right of Fig. 7 it will be seen that when the valve has turned so that its exhaust port registers with the port in the cylinder the burnt gases will pass directly through to the exhaust manifold and the open air. Fig. 5 presents the valve and its position between the two cylinders; although in this case the former has been pushed away to show the construction at this point. By careful study of this and the other drawings the whole design will be readily understood.

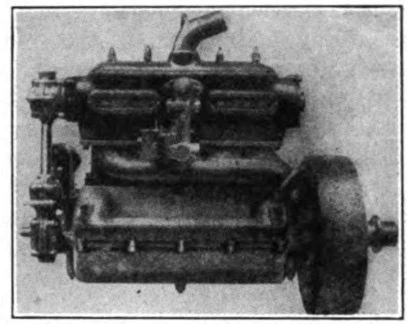


FIG. 9—THE DARRACQ-HENROID ROTARY VALVE MOTOR

The Darracq-Henroid Motor

A rotary valve motor, which has its origin in France and which made its first appearance in America during the Importers' Salon at New York in January, is the Darracq-Henroid, utilized in the 1912 Darracq cars and represented in this country by Ducasse & Co., 735 Seventh Ave., New York City. This design employs a cylindrical sleeve which is hollow, to obtain a greater degree of lightness and rigidity, on the periphery of which are cut four notches, each serving to connect one cylinder alternately with inlet and exhaust ports. The round portion of the sleeve covers the port in the engine cylinder during the compression and expansion strokes, and as a result the sleeve itself travels at half crankshaft speed.

In order to set the valve cylinder in motion a gear wheel is located at the end. Another gear wheel is keyed on the end of the crankshaft and the two are connected by a vertical shaft bearing a worm gear at either extremity. The relation between these gear wheels and worms is so calculated as to obtain one revolution of the sleeve for two of the crankshaft, and the correct valve timing is thus attained.

Fig. 9 herewith presents the motor assembled, and Fig. 10 the bloc casting and the cylindrical sleeve, or distributor, as it is termed. This distributor is located along the side and at the top of the engine cylinders as is brought out more clearly in the sketch, Fig. 11, which shows the cycle of operations.

How It Operates

The drawing at the right indicates the intake stroke when the revolving distributor has reached a point where the slot registers with the port in the side of the engine cylinder. The piston has moved downward from the beginning of the stroke and will continue in this direction until it reaches the point indicated next, which depicts the beginning of the compression stroke. The third shows the position of the members at the time of firing, while the last presents that of the piston and distributor at the time of exhaust.

During the first part of the intake and until the downward movement of the piston discloses the orifice of the feeding port no gas will be admitted to the cylinder, and this will last during a period equal to about one sixth of the total piston travel. The designer claims that with the very large section which the distributor affords to the exhaust gases the cylinder is emptied with such unusual abruptness that nearly the whole of the residue gases, as the consequence of the laws of expansion of gas, is exhausted, and the moment the inlet begins, the top of the cylinders would contain a burnt gas at a very weak pressure, inferior to that of the atmosphere, and this would cause the feeding to take place much more quickly and thoroughly as soon as the feeding orifice is disclosed. This brings up a question upon which there is a decided difference of opinion among engineers and involves the problem of the exact volume of burnt gases which must be retained in order to improve the suction stroke subsequent to the explosion.

Matter of Lubrication

At no point along its periphery does the distributing sleeve come in contact with the surface of the casing in which it revolves. The designer claims that as it is carried at either end on large ball bearings it will defy wear forever. But if there were no

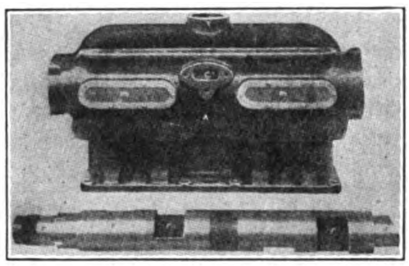


FIG. 10—SHOWING CYLINDER CASTING AND SLEEVE OR DISTRIBUTOR

means of filling this intervening space the engine could not become gas tight.

The space between the sleeve and the casing is only about a twentieth part of a millimeter; the exact measurement having been determined by a series of experiments covering many months. It is claimed that, were it any larger, the oil coating, with which this space is completely sealed, would be swept away. As the matter now stands the sleeve is completely covered with a thin coating of lubricant which forms an oil joint exactly sufficient to support the necessary pressures. The distributor is placed in such position that at the moment the compression reaches its maximum point the top of the piston has covered the orifice of the port leading to this oil coating and the latter has no more part to play during that portion of the cycle.

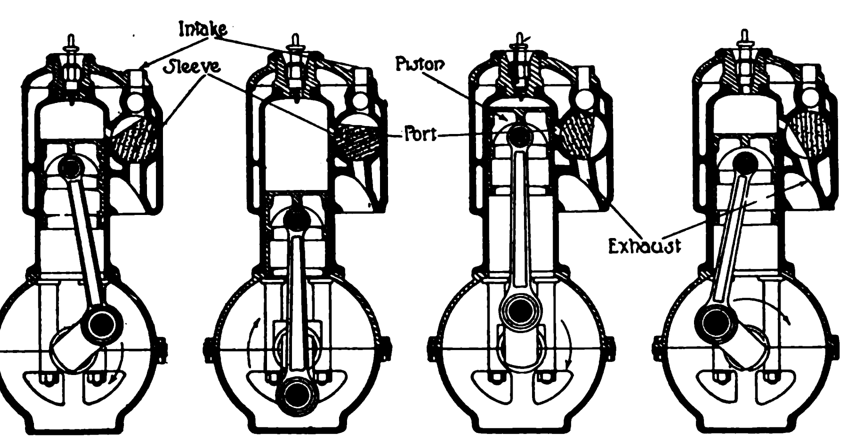


FIG. 11—SHOWING HOW THE DARRACQ-HENROID MOTOR OPERATES THROUGH ITS VARIOUS CYCLES

Oil Engines

F. G. Hobart

Nearly everybody is familiar with gasoline engines—they have come to be an important factor in our everyday life, and their numbers and varieties are rapidly increasing. While these applications and types are numerous, it is noteworthy that the principle involved in the utilization of this liquid fuel is closely the same in all of them. The method of mixing gasoline vapor with air as it is sucked in by the engine piston, through some sort of carburetor or mixing device, the subsequent compression of the charge, and its ignition by electric spark, is common to nearly all.

It is not so generally known that engines are now available for stationary use as well as for the heavier applications, such as portable engines, tractors, pumping engines, hoisting engines, etc., to run on kerosene and the still heavier distillates. The success of these engines on these low priced distillates makes it reasonably certain that there will be a very great increase in the use of this type of engine. These heavy oils referred to are a necessary product in refining. Crude oil from different oil fields, and even from different wells in the same field, differs in character, and the proportions of the various useful products vary accordingly; but it is well known that in the process of distillation only a small percentage of gasoline and other distillates that can be used in gasoline engines will be obtained, while a very much larger percentage of kerosene and of distillates slightly heavier than this are necessary products. The still heavier distillates are in demand for such uses as the firing of locomotives and other heating applications, road oils, etc. The increasing demand for gasoline and other lighter oil, however, results in the production of large quantities of kerosene and heavier distillates, which are now available and are likely to continue so at low prices.

The first requirement of a successful oil engine is that it shall run well; all other considerations, such as

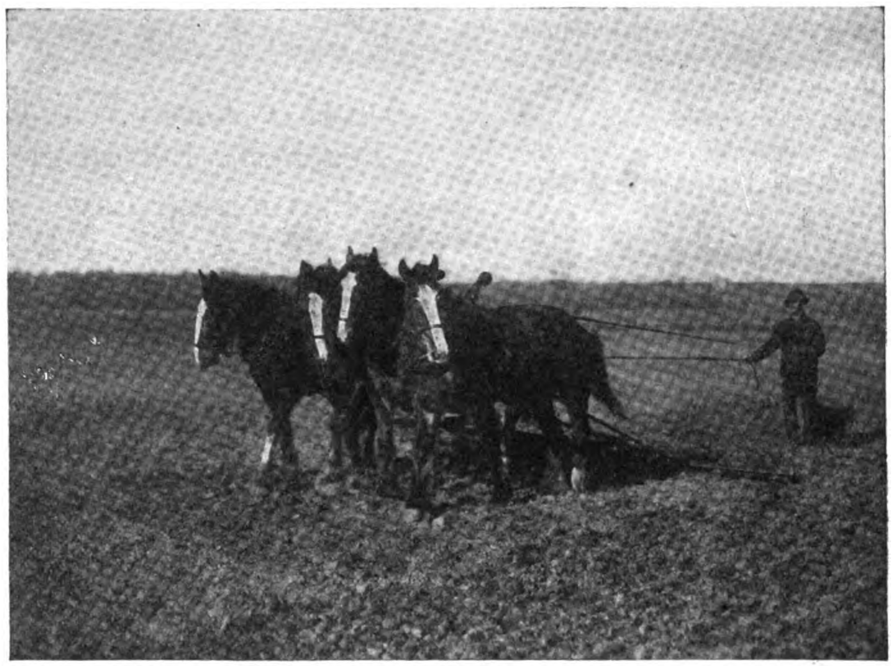
economy, appearance, speed, etc., being less important than reliability and general good running qualities. Requirements next in importance are, that it shall start with little delay and trouble; that it shall not have unpleasant odors or a smoky exhaust; that it shall be reasonably flexible, running equally well on full load and on no load and on widely variable loads; that it shall run well where considerable variation in speed is required, and that, where service requires it, it shall run steady enough at least for commercial electric lighting; that it shall be reasonably low in first cost; that it shall not require a machinist to operate it and keep it in running order, and that little time shall be required for its necessary attention.

The types of oil engines that have been brought out are more numerous than types of gasoline engines in common use in the principle of operation. The Diesel engine is a type well known to engineers, but not very extensively in use. This engine uses oil with excellent economy, and in the matter of thermal efficiency is second to no other heat engine. It depends for its operation on the use of extremely high compression; this being as high as 500 lbs. per square inch above atmosphere. A charge of air, without admixture, is sucked in by the piston and compressed to this high pressure. The heat of compression is depended upon to ignite the charge of oil vapor, which is introduced at the end of the compression stroke by means of air under much higher pressure. This high pressure injection air is compressed in auxiliary compressors and stored in tanks or bottles at a pressure frequently running as high as 1000 lbs. per square inch.

From this brief outline of the principle of operation of this engine it is apparent that it is only suitable for larger sizes; also that it requires exceedingly heavy construction, refined workmanship and skillful attendance to insure successful and safe operation. The use of such extremely high pressures requires the greatest care both in construction and operation to avoid dangerous accidents and in keeping up the operation of the engine, which is absolutely dependent on the maintenance of these pressures. These characteristics also result in a very expensive installation. While this engine has been before the public for many years its use is still very limited.

There have been numerous attempts to reach the economy shown by the Diesel engine with other types not open to the objections incident to the use of such high pressures, and some engines of this nature are now offered. The ignition in such cases is usually obtained by means of surfaces without water jackets, communicating with the combustion chamber, in which the heat of combustion keeps the walls hot enough to insure ignition. In starting these engines this hot chamber is usually heated by means of an outside burner or torch and oil introduced by hand the objections of requiring outside torch for starting; combustion is usually imperfect; resulting in a smoky, disagreeable exhaust, which also has the peculiarity of causing considerable deposit of carbon in all of the exhaust passages; this being so serious as to necessitate rather frequent removal of same to prevent complete stoppage of the exhaust.

All of the types mentioned require the mechanical injection of the liquid fuel, either by means of injection pumps or by compressed air, with timed admission valve governor; all these attempting to control the quantity of oil admitted at each stroke. The details of these



HARROWING WITH THE AID OF FOUR OF MAN'S MOST FAITHFUL FRIENDS

pump. These engines are subject to nearly as high cylinder pressures as the Diesel and require nearly as heavy construction. The cost of installation and the requirement as to high grade attendance is, therefore, much the same, and they are open to the further objection that it is less convenient to start them, owing to necessary means of an outside heater.

Another type of oil engine is the two-cycle, using compressions not higher than 150 lbs.; the fuel oil being introduced by injection pump during the period of compression, and ignited from hot bulb, which must be heated by a torch before the engine can be started. These engines are of much poorer economy than the two types above mentioned; have oil injection systems are necessarily elaborate and, consequently, liable to derangement. Moreover, the successful and satisfactory operation of the engine is absolutely dependent upon these features.

An oil engine has been developed and perfected to use successfully the low grade petroleum oils above referred to. This engine operates on very moderate compression; uses about the same number of gallons of oil in a given time as an ordinary gasoline engine of corresponding size on the same load; can be started immediately on gasoline same as a gasoline engine, then changed, after a few minutes of running, to the heavier oil; it is only of moderate expense in first cost; requires no higher grade of attendance than a

gasoline engine; is just as reliable; runs with reasonably clear exhaust; can be obtained in full variety of sizes and for various services, such as stationary, portable, traction, hoisting, pumping, electric lightng, etc.

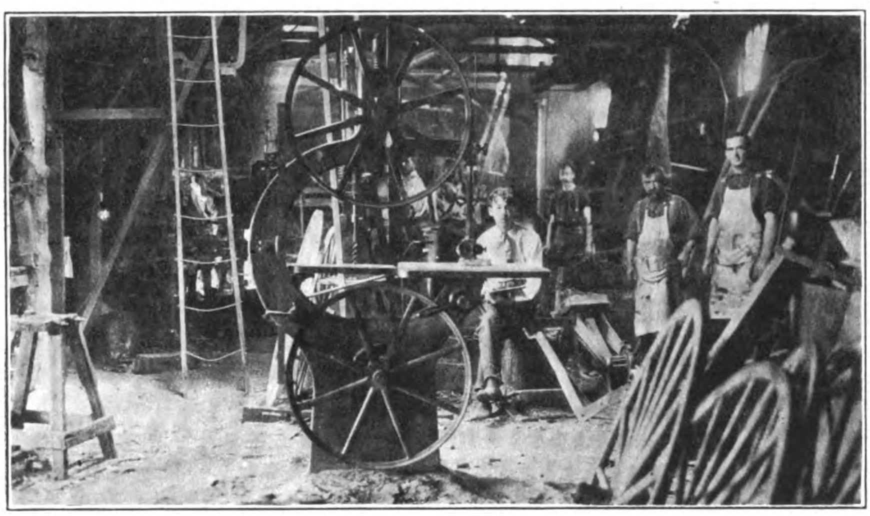
In comparing these engines with other types of oil engines the entire expense should be figured in each case comparing with the service obtained; and in the expense must be considered the interest on investment, cost of attendance, lubricating oil, etc. A careful consideration of these items will frequently show that the single item of fuel consumption with cheap oil is frequently not the most important; and that interest on investment, attendance, good running qualities, facilities of repairs, safety, etc., are all favorable to the lower compression engine.

A Well Equipped Power Shop of Australia

P. Real

The accompanying engravings show a view of the wood-working department and also a picture of the smithing section. We have a Newton 6-H. P. oil engine with which we drive blower, lathe, drill, band saw, emery and grindstone. We have a cold tire setter which does the work in about half the time required by the old way. If light tires are very loose we sometimes pull them up in the hot shrinker, as customers do not like to see their tires swollen up in several places. We have a light frame operated with a screw, which we put on the wheel while it is in the setter to prevent dishing.

In reference to welding axle stubs, we use a V-weld and put them in tire shrinker. We heat the two ends separately, push them together and at the same time hammer them while in the machine. We finish them up on the anvil. To keep the collars clear of the machine we put two pieces of iron on the inside. The outside grippers alone will hold the axle. Sometimes it is necessary to take a wash heat to weld in the scarf, but as a rule it can be done in one heat, and you have a perfectly safe weld. We weld all large sizes of steel in this way, using nothing but a sprinkle of sand. We build all kinds of wagons and buggies and do general work, motor repairs and shoeing.



THE WOOD-WORKING DEPARTMENT OF A WELL-EQUIPPED AUSTRALIAN SHOP

Another Case Which Teaches a Lesson in Partnership Law

Before I leave the question of partnership, the blunders and difficulties that are constantly arising under it, and how some of them at least can be avoided, I feel like relating another recent case with which I myself have been indirectly connected. My feeling is that too much cannot be said on this subject, for the courts and the case books are full of cases in which misunderstandings of the partnership obligation have brought disaster.

The responsible party in the case referred to I will call A. He is the sole owner of a printing business which up to two or three years ago yielded him a good living. About that time through a variety of conditions which I need not go into here he got into difficulties and began to limp. The limp became more and more pronounced as time went on. In an unguarded moment he allowed himself to sign about half a dozen notes and when they came due was unable to pay them. The payees sued, and suddenly A found himself in a peck of trouble. While he still had a going business, his liabilities greatly exceeded his immediately available assets as many a solvent business man's liabilities do, and it began to look like bankruptcy.

The easiest way to approach the matter was to call a meeting of his creditors, and that was done. The situation was frankly explained and after compromising with a few of the more urgent creditors an extension was granted by the others which promised to work the man out of his difficulties within a year. A committee of creditors took nominal charge of his business, though he remained the active manager as before.

Up to this time there was nothing in A's case but misfortune. A short time after the extension with his creditors was arranged and everything was moving smoothly some enthusiastic schemer approached A with a plan to make him a great deal of money in a short time. The scheme was to organize a company to give a pure food show which I will say, parenthetically, usually either pays largely or loses largely; there appears to be no middle ground.

The scheme sounded alluring and A allowed himself to be persuaded to go into it. Not to contribute any capital, because none of the three partners thought it necessary to do that, but to contribute the use of his name and do the necessary printing which ran into a large sum of money.

There were three promoters of the food show, A and two others. They did business under a company name; and A professed afterward to believe that this alone made it a corporation and relieved him from personal responsibility. Of course this was a huge mistake; regardless of its name the concern was a partnership with every characteristic of one.

Of the three partners, A was the only one with a stick of property.

One of the others was an honest, but impecunious newspaper man, and the third was shiftless and without two cents to rub against each other. He was taken in because of some knowledge he was supposed to have of conducting food shows.

Here, then, was the danger point which A should have seen. In spite of his unpaid liabilities he was by no means execution-proof, for all of his considerable property was still in his own name. He had not gone into bankruptcy nor made an assignment, there were no judgments against him and any creditor who obtained quick judgment against him could have gotten in before any of the creditors who had granted the extension and either obtained a preference or forced bankruptcy proceedings and upset the whole extension plan.

In spite of this, A calmly put himself in a position where he was liable for any and all of the acts of his two impecunious partners, provided they were done in connection with the partnership.

The food show was a mismanaged fizzle and left behind it a long trail of creditors who have not and will not get one cent of their claims. Most of those took their medicine, but one especially pertinacious claimant discovered that A had considerable property in his own name and brought suit to recover on a partnership claim of $300. The facts were clear and undisputed and A was advised by his counsel that at the appointed time, not very far away, judgment would undoubtedly be taken against all three partners trading as the company with the power in the plaintiff to issue execution against all three together *or any one alone.* The Creditors' Committee began to take notice and it looked as if the chance of surmounting his difficulties which A had obtained after much trouble from his creditors was doomed to be knocked in the head and be thrown into the bankruptcy court to be stripped of everything.

At the last moment a friend stepped in, took an assignment of the claim and settled it.

Now, the lesson of this case is plain: No man should form a business association with another or with others without first considering well his status under the law by reason of that relation. Such an arrangement is almost certain to be a legal partnership, even though it is not intended to be, and if it is, the unfortunate individual who entered it with his eyes closed is at the absolute mercy of his fellow partner or partners.

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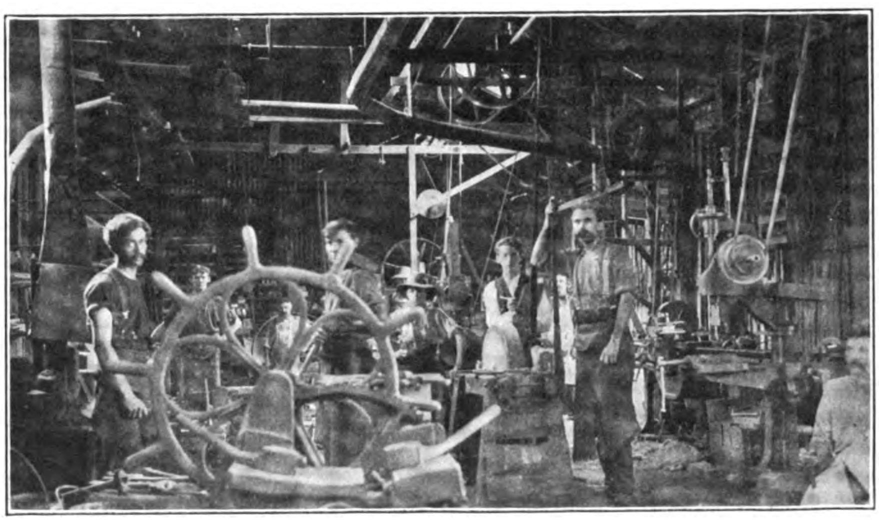
Wheel Heights and Tire Widths and How They Affect Draft and Road

From *Missouri Road Bulletin*

The question of wide or narrow tires is of more moment than many upon first thought consider it. It is a question of administration which concerns maintenance. Road maintenance is no small consideration; in fact it is second only to construction. Wide tire regulations are not a new idea nor a wild notion of reform. All of the European nations having good roads prohibit the use of narrow tires. The width of tire is regulated according to the load that the wagon is designed to carry; the heaviest-loaded wagons having tires as wide as ten inches. Austria requires tires of not less than 4 1-3 inches in width; France, from 3 to 10 inches, depending upon the load; Germany, not less than 4 inches; Switzerland, a minimum width of 6 inches.

It is generally supposed that narrow tires destroy only roads of a soft or yielding character, but the same action that occurs on a soft road takes place only in a much less degree on the hardest pavements. The principle of the tire is the same as putting a hard surface on the road or as that of snowshoes. The sinking action is prevented by distributing the weight over a large area. The sinking of wheels into a road surface is due to the fact that the road is too soft and the wheels too narrow for the load they carry. The universal use of wide tires would have more tendency to compact and iron down the road surface than that of the narrow tires. Wide-tired wagons draw materially lighter over almost every kind of a road than those with narrow tires where the wide tires are universally used.

A test of tire width was made at Atlanta, Ga., in 1895, in which wagons of equal weight and loads were drawn over a wet piece of clay road; one wagon having two-inch tires and the other four-inch tires, and with rear wheels farther apart than the front wheels. Twice as much pull was required on the two-inch tired wagon as on the four-inch, and that part of the road traversed by the two-inch tired wagon was cut and rutted to a depth of several inches, while the four-inch tires had rolled the road to a smooth, firm surface, At the agricultural station of Utah it was found that a one and one half inch tired wagon drew about 40 per cent heavier than a wagon with three-inch tires. Loaded with 4,480 pounds, the wide-tired wagon could easily be hauled over an earth road in good condition by two horses, while one half as much was a full load for two horses with the narrow-tired wagon.



THE BLACKSMITH DEPARTMENT OF MR. REAL'S POWER SHOP IS ALSO WELL EQUIPPED

A series of tests were made at the Missouri Agricultural Station during the years 1896 and 1897. Director Walters stated that the conditions under which the narrow-tired wagon offered an advantage over the wide tires were unusual and of short duration, and that through a majority of days of the year when the earth roads are most used the broad-tired wagon will pull materially lighter than the narrow-tired one. He further gave it as his opinion that six inches was the best width for a combination farm and road wagon, and that both axles should be of the same length, so that the front and hind wheels run in the same track. The following is the general summary of these experiments:

1. On Macadam Street.—An average of the two trials made—a load of 2,518 pounds could have been hauled on the broad tires with the same draft that a load of 2,000 pounds required on the narrow tires.

2. Gravel Road.—In all conditions of the gravel road, except wet and sloppy on top, the draft of the broad-tired wagon was very much less than that of the narrow-tired wagon. Averaging the six trials—a load of 2,482 pounds could be hauled on the broad tires with the same draft required for a load of 2,000 pounds on the narrow tires.

3. Earth Roads.—(a) When dry, hard and free from ruts and dust, 2,530 pounds could have been hauled on the broad tires with the same draft required for 2,000 pounds on the narrow tires. (b) When the surface was covered with two or three inches of very dry, loose dust, the results were unfavorable to the broad tire. The dust on the road in each of these trials was unusually deep. (c) On clay road, muddy and sticky on the surface and firm underneath, the results were uniformly unfavorable to the broad tires. (d) On clay road, with mud deep and drying on top, or dry on top and spongy underneath, a large number of tests showed uniformly favorable to the broad tire. The difference amounted to from 52 to 61 per cent, or about 3,200 pounds could have been hauled on the broad tires with the same draft required to draw 2,000 pounds on the narrow tires. In this condition of the road the broad tires show to their greatest advantage.

As the road dries and becomes firmer the difference between the draft of the broad and narrow tires gradually diminishes until it reaches about 25 to 30 per cent on dry, hard, smooth earth, gravel or macadam road, in favor of the broad tire. On the other hand, as the mud becomes softer and deeper, the difference between the draft of the two types of wagons rapidly diminishes until the condition is reached when the mud adheres to both sets of wheels; here the advantage of the broad tires ceases entirely, and the narrow tires pull materially lighter. (e) Clay road, surface dry. with deep ruts cut by the narrow tires in the ordinary use of the road. In every trial the first run of the broad tire over the narrow tire ruts has shown a materially increased draft when compared with that of the narrow tire run in its own rut. The second run of the broad tires in the same track where the rut is not deep completely eliminated this advantage, and showed a lighter draft for the broad tire than the narrow tire showed in the first run.

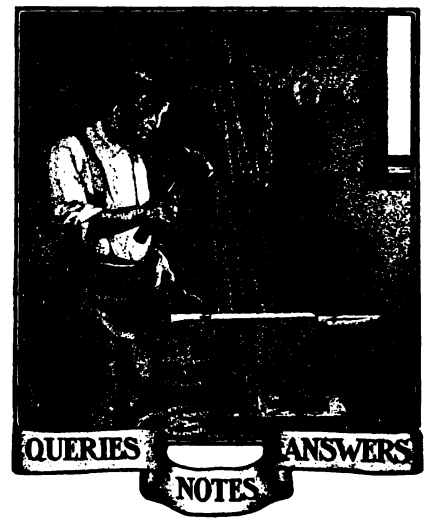
Where the ruts were eight inches deep with rigid walls, three runs of the broad tire in its own track over the ruts were required to eliminate the disadvantage. Three runs of the broad tire over this track have in all cases been sufficient, however, to so improve the road surface that both the broad and narrow-tired wagons passed over the road with less draft than the narrow tires did in the original ruts. In addition to the saving of draft the road was made very much more comfortable and pleasant for the users of light vehicles and pleasure carriages by the few runs of the six-inch tire.

Summing up all the tests on earth roads, it appears that there are but three conditions on which the broad tires draw heavier than the narrow tires, viz.: (1) When the road is sloppy, muddy or sticky on the surface and firm or hard underneath; (2) when the surface is covered with a very deep, loose dust and hard underneath; (3) when the mud is very deep and so sticky that it adheres to the wheels of both kinds of wagons. It appears that the dust must be extraordinarily deep to show a higher draft for the broad than for the narrow tires. The three conditions just named, therefore, are somewhat unusual and of comparatively short duration.

4. A large number of tests on meadows, pastures, stubble land, corn ground and plowed ground in every condition, from dry, hard and firm to very wet and soft, show without a single exception a large difference in draft in favor of the broad tires. This difference ranged from 17 to 120 per cent.

5. It appears that six inches is the best width of tire for a combination farm and road wagon, and that both axles should be the same length, so that the front and hind wheels will run in the same track.

(To be continued)



Why Did They Break?—One of the smiths in our shop was making a couple of circle plates out of 2½ by ⅝ iron. After having the ends scarfed he heated it all around to a black heat and put it in a tirebender to bend to a circle. It snapped off about two feet from the end. Three did this in succession. The others were then put through the bender quite cold and were all right, none of them breaking. Will some brother smith explain the reason for this?

E. E. Bottroff, South Australia.

From A General Smith of Australia.—We do all kinds of work—shoeing, making heavy wagons, drays, plow work and, in fact, everything that a farmer requires.

I like to read the views of the different brothers on shoeing, as some of them are very good and worth reading. If some of the record breakers would come over here we would all soon be out of a job as far as shoeing goes.

There are several other smiths in this town getting The American Blacksmith and they speak very highly of it.

I might say that we do a lot of motor car repairing, being agents for five different cars. The Ford car seems to be the favorite over in this part; although there are many other makes used.

Thomas H. Caddy, West Australia.

A Large Establishment of Victoria.—We have a large carriage factory employing eighty hands in the general manufacture of vehicles, carriages and motor-car bodies. We conduct a large repair department and carry practically the largest stock of new and second hand vehicles in the State of Victoria.

In connection with and as an adjunct to our vehicle business we conduct a livery stable, and have a shoeing forge under our own management. We have also a harness

department which is steadily increasing as an important part of our business, and although we only employ four men in this branch we have a very considerable sale for harness which we buy from local wholesale houses and import.

Trade has been very good for some years; but owing to the lack of summer and autumn rains there is a likelihood of business being quiet during the ensuing winter months.

COFFEY BROS., Australia.

A Word from New Zealand.—I am a country smith; my principal work consisting of horseshoeing, a little trap work and general repairing.

Touching on the very fast shoeing that I see some smiths can do, I think if I turn and fit six or seven sets of shoes in a day it is good work; that is, doing the work alone and working eight hours a day.

I notice that the tires used on wheels in America are much lighter than we use here. A gig tire is 1¼ by ⅝ or ½; vehicles for heavy work have a tire 1¾ or 2 by ⅝ inches; gravel carts, 4 by ¾ or ⅞, and for timber wagons, 5-inch tires are the general rule.

This district is one of the oldest gold mining sections of New Zealand. Besides gold, there is a coal mine, with prospects of one or two more opening up, and the wonderful iron deposits at Para-Para are only a few miles away.

J. W. F., New Zealand.

Some Suggestions from Australia.—I venture to suggest that if the questions and answers in each issue would appear together it would be much better. Those questions for which an answer has not yet been found could be printed in a separate section for readers to answer, and if such questions remain unanswered after being inserted five or six times they could be dropped out.

I have been in business for only a little over twelve months, but have had plenty of work. The prices here are fairly good, but the credit system is too much in evidence. The credit system and how to remedy it would be a good item for discussion in "Our Journal."

As you are no doubt aware it took a lot of persuasion on your part to make me become a subscriber, as I was then getting two trade journals and thought another one too many. I am not sorry now that I took THE AMERICAN BLACKSMITH. I have since given the others up. Labor is very scarce our way and what we do get we have to pay for. Every trade seems to be at full pressure; no doubt on account of the good seasons we have had.

W. C. LIENERT, South Australia.

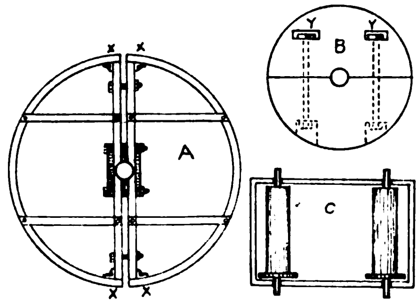
Some Comment and A Question.—I am a new subscriber to THE AMERICAN BLACKSMITH and do not see how any smith can get along without it.

I read Mr. Elton J. Buckley's way of collecting accounts as given in the April number, and have tried the first and second of these three times with good success on accounts that have been standing for a long time.

I do all kinds of work, but I like horseshoeing and plow work the best. I cannot, however, drive four shoes on in four minutes, as I notice some of the other smiths are doing.

Brother P. V. Johnson's method of welding tires easily and quickly has proven satisfactory. Brother Hillyer's article on tempering a cold chisel and driving it through a 1-inch square piece of soft cold steel shows that he knows the secret of tempering. I do not doubt his word, for I have cut a 1½-inch buggy axle with my cold chisel, only I cut all sides, and it stood without breaking. Now I am going to try and drive it through a 1-inch square piece of soft steel. I try 'most all the new ways of doing things that I find in "Our Journal." I would like to ask some brother how to make horsestocks. B. TIMBERMAN, Indiana.

Shoeing and Tire Setting.—I enjoy reading THE AMERICAN BLACKSMITH, especially the talks on shoeing. There is as much in trimming and nailing the shoe on as there is in fitting the shoe to the foot. It takes all of this to make a good job. I have been at



SHOP-MADE PULLEYS AND A WHEEL HANDLER

the trade twenty-two years and learn something every time I shoe a horse. I have set up and put on four shoes in eighteen minutes; but cannot do it for ten hours, six days in the week; and I don't think any other smith can, either. Besides, you cannot do the horse justice in that length of time.

Regarding tire setting; let us be broad in our viewpoint and look at it from both sides. We know that iron and steel have a tensile strength, and we know that if it is pulled until it is longer that it will be proportionately weaker, i. e., if it is upset until it is shorter it is weaker. This, of course, all depends on the amount it is upset. If the upsetting is done hot it will not weaken but strengthen the tire. But we should do the job as the man wants it done, and if we wish to be up to date we should have both machines to suit both kinds of customers. Let the man that pays for the work have his choice, as there are always two sides to a question.

H. T. FINNEY, Arkansas.

An Amateur's Questions.—I notice by reading THE AMERICAN BLACKSMITH that your style of shoeing differs in many ways from the Colonial methods. Out here they like the shoes to stay on for three or four months, or as long as the shoes will last; but I think that is the cause of a lot of the feet going wrong and getting out of shape. I have one or two horses to shoe that are bad for brushing with the hind feet. Do you think some blacksmith through the paper could give me some plan that would prevent or even perhaps cure them from brushing?

I never served an apprenticeship in blacksmithing, but secured my knowledge of shoeing from my father who was a blacksmith by trade. A few years ago I built a dray for my own use, although I had never previously seen or done any of that kind of work. The result was entirely satisfactory. Lately I have purchased a pair of wheels and axle, and intend making a steamboat dray. They are splendid on a farm for carting straw or chaff. There is one thing I do not know exactly how to go about, and although it is not altogether in the blacksmithing line perhaps some smith could give me some information on the subject. When bolting the shafts to the axle, how would you true them with the wheels? You will understand that unless the shafts and wheels are running exactly true the dray will not run properly. To a tradesman this may be easy but to me as an amateur it is not an easy job.

HARRY MACDONALD, New Zealand.

Shop-Made Pulleys—A Wheel Handler.—This is how we make our pulleys: The larger ones are made of wood rim stock for the face, braced and held to the shafting with 1-inch round stock and ½-inch bolts. The face of the pulley may be any width, made of rim stock 1¼ inch thick. The pulley is built up in half sections and braced as shown in the engraving at A. At XXXX are corner pieces of strong sheet iron. These pieces are bent and then bolted to the rim and to the center rods. To form the hub of the pulley, take two plates of ¼-inch thick material and fasten them with the ½-inch bolts by which the pulley is held to the shaft. The position of the other bolts is shown in the engraving. After the pulley is placed on the shaft it may then be turned so as to be perfectly true.

The pulley at B in the engraving shows the style we make for sizes from two feet and smaller. These are quickly and cheaply made. They are very simple and the engraving shows their construction quite clearly. The holes or mortises at YY are cut entirely through the wood and should be large enough to admit a wrench to turn the nuts. The holes shown by the dotted lines are bored from the face of the pulley. The holes for the bolts are then bored and the bolt inserted; the head of the bolt going well down in the hole at the face and resting against the shoulder formed at the bottom of the hole. The two parts are now placed on the shaft, the nuts turned up on the bolts and the pulley fastened rigidly to the shaft. The holes for the bolt heads are now tightly plugged and the pulley turned so it will run true.

The device shown at C is for handling heavy wheels. It is simply a frame with two rollers mounted on it. It is placed on the floor and with another roller fastened to the wall as shown at Z. A heavy wheel can be very easily handled at a minimum expenditure of time and strength.

At the present writing I am making an exhaust fan to be used in a boot-making establishment to carry away the dust made when dressing soles. Our principal work is shoeing horses, repairing plows and making drays, wagons and light vehicles. We have been in business here for thirty years, and while we have not made a fortune we have made an honest living. There are four cheese factories in our vicinity and all the milk vats used at the present time in these plants are of our make.

HUGH CHISHOLM, New Zealand.

A Tire Cooler and A Question.—I have lately designed and put down a sinking tiring plant. I put the wheel on the platform with screw through the center of the hub to hold the wheel in place. Then I put the tire on hot, and a lever lowers the platform and wheel completely under water. The only objection is that it wets the wheel all over, but it does splendid work on heavy wheels. I tire wheels up to 5 feet in diameter, the tires being 5 inches wide and 1¼ inches thick. I also invented a lever slide shifting seat for 2-wheel vehicles, so as to balance with any reasonable load. I did not patent the lever slide, but since I took first prize in local shows some few years ago with vehicles fitted with the slide it has come into general use with leading coach builders throughout the district.

Would be pleased to have some brother give me a recipe for trimmers' paste for the falls in front of cushions. I have trouble with my paste blistering.

I wonder if the smiths in America are compelled to work strictly in accordance

with industrial arbitration awards as we do: i. e., eight hours per day and wages per day and no piece work except trimmers and painters and these latter must make 11s 3d ($2.74) per day of eight hours. All apprentices must be indentured in writing and a copy sent to the registrar. One apprentice only is allowed to three journeymen. If American smiths are interested I will send copy of our industrial awards.

CHAS. J. LATTER, Mullumbimby,
N. S. W., Australia.

A Peculiar Accident—Tire Work.—I wonder if any blacksmith has had an experience like the following: A few days ago I was shoeing a small Spanish mule. In cutting off about an inch of the shoe I was making the piece flew up in the air and when it came down it landed right in the ear of the mule. It was at white heat, and I thought at first it was going to kill him. He finally succeeded in getting it out, but not until the ear was badly burned. It is now giving him some trouble.

A great deal has been said on hot and cold tire shrinking. In my opinion a blacksmith who does not use a cold shrinker is a back number, and one that sets all his tires on a cold shrinker does not know his business. In other words, use it when it will do the work. A few months ago a brother said he did not like his cold shrinker as it kinked seventy-five per cent of the tire. A mechanic who gets results like this from a cold setter would not be able to use a hot machine to the best advantage, and ought to be compelled to cut and weld his tires.

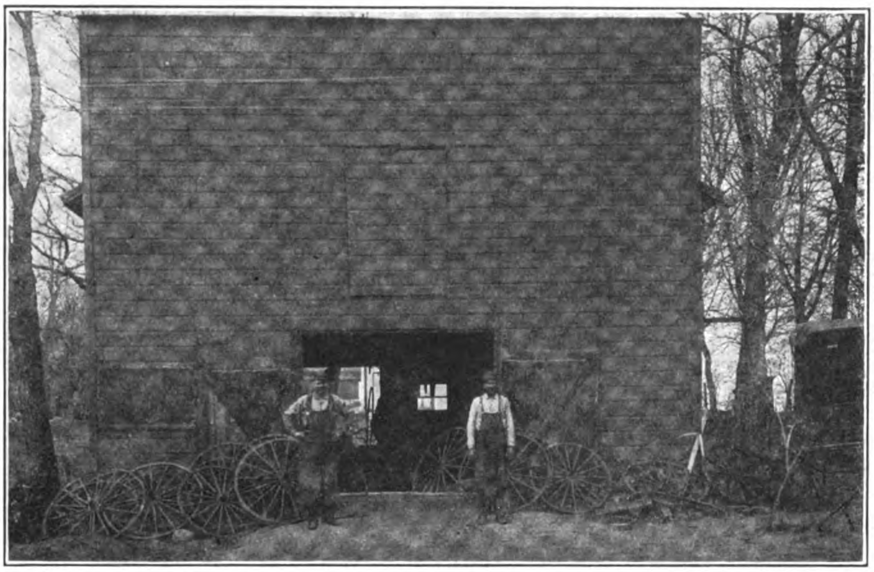
I have noticed several hot men ask how can you shrink a tire smaller than wheel, cold? I have tried it and after knocking off the tire I run my wheel and then the tire and found the tire from $\frac{1}{16}$ to $\frac{1}{8}$ inch smaller than the wheel. Now the hot man will ask "How could that be?" The wood gave way to the tire the same as when shrunk hot. There is so much work the hot machine will do that a progressive man cannot afford to do without one. I would like to see less talk on tire setting and more talk on good carriage forging. I would like to see some information on fifth wheel forging. I advocate power in the shop, as also higher prices on a cash basis. J. KEITH, Texas.

Business and Wage in Victoria.—My business is a general one—coach, carriage and wagon work with a little horseshoeing. I find price cutting conditions in the craft the same the world over. Why is it that we cannot work together and uphold prices? In some cases smiths actually do the work for less than the cost of the material. I charge a fair price, do good work, but often lose work because my price is considered too high. However, my policy is that if I cannot get a paying price for the work I don't want it.

I like to read "Our Journal." It is a puzzle to me how some of our American cousins do the work in the time they say they do; horseshoeing particularly. I note one man says he can weld on a set of $1\frac{1}{4}$-inch buggy axle stubs, single-handed, set boxes and pur the axles on gear, in a day. I, and no doubt others, would like to know how he contrives to weld the stubs on single-handed. I require someone to take the stub from the fire, also a striker, and often have difficulties in welding these same stubs on. Some brands are worse than others. I would suggest that some American axle maker give a recipe for a flux to be used on their particular brand of axles. This I believe would be an incentive to smiths here to purchase their make of axle, providing a proper flux was named.

Trade here is in a prosperous condition. The wages of woodmen are ordinarily £3 ($14.60) per week of forty-eight hours; smiths, £2 15s. ($13.38); and strikers £2 2s. ($10.22). On January 27th a Wages' Determination Board went into force. Trouble is sure to come as a result, for prices must go up; but the general public or consumer will need a great deal of education in the matter. Still some smiths will not raise their prices, but pay their employees big wages, and then they wonder how they are going to make both ends meet.

W. T. PLUMBE, Australia.



THE GENERAL SHOP OF MR. H. BENSCHOTER IN MINNESOTA

Cold Tire Setting.—Last April I purchased a cold shrinker. The news of its arrival soon spread, and many wanted to see it work. Up to date I have set hundreds of tires with not one complaint; although I guarantee that if the work is not O. K. I will make it good. I would not think of going back to hot shrinker again; for the old way is more guesswork than the cold method; perhaps because you do not know just how far the spoke is going into the hub. The wheel may be rimbound after you have gotten the tire on hot. Now with the cold tire setter y[illegible]an see just [illegible]much you are drawing [illegible] wheel, and [illegible] it gets rimbound you [illegible] saw out and shrink again until it is s[illegible] Again, I shrunk a tire on a wheel that I placed the tire on with my hands, and I had 5-16-inch solid draw; so that I don't agree with Bro. C. W. Needles. The cold setter, of course, has no brains, and if the operator does not know when the wheel is solid with no loose or broken spokes, or dished, the shrinker certainly does not know.

Now, Brother Wagner, if you get the right kind of a shrinker it will make a clean job. I have used homemade tools; but now use nothing but power tools, all manufactured products; and find that there is as much difference between them as in the old bellows and an up-to-date blower. The shrinker draws trade and does not keep the customers waiting all day.

In riveting boilers I have drawn many a rivet cold and it held cold water. There is no use to dish a wheel cold when the tire is tight and solid. That is all you can do. The more you draw the more dish you have. How are you going to stop a hot tire from drawing when you have given it too much draw? It will come and bring the dish with it. With the cold setter you can stop when the dish is coming and the tire is tight and the wheel solid.

O. R. MANVILLE, Missouri.

Tempering Chisels.—I would like to ask Mr. Hillyer through the columns of "Our Journal" to what color he draws the temper on the chisels mentioned in the October, 1911, and April, 1912, issues, and whether he draws temper more than once,

I have succeeded in doing with some ½-inch and ⅝-inch octagonal chisels made out of .85 carbon open hearth steel, but I have drawn the temper to a chestnut brown, some of them three times and one four times. I have also driven a ⅜-inch octagonal drawn down to a square point through a piece of 1-inch square mild steel, but they were drawn four and five times to a chestnut brown and were cooled in the fan blast after each drawing. The chisels were cooled in warm water. J. W. H., Ohio.

In Reply:—I harden the chisel its entire length in a bath of tepid salt and rainwater. It has to be hardened all over or it will bend from the hard blows it gets in being driven through. After being hardened I hold it over the fire for a few seconds with the thin end up, so as to take off some of the strain. Then brighten it up with a piece of emery cloth, so the colors can be plainly seen. A chestnut brown is about right for .85 carbon open hearth steel. For higher carbon I lower the color accordingly. If the color comes nice and even all over I only draw it once. If it comes in spots and streaks I draw it twice. In drawing the temper I gauge the heat so that it cools off itself and leaves the right color. If I see it is going to run over this color I dip it in oil. The end that is struck with the sledge should be drawn soft for about a half inch.

Although all these things are necessary in making a chisel I put more dependence in the forging, packing and hardening heats than I do in the colors it is drawn to afterwards. The forging heat is governed by the carbon in the steel. The higher the carbon, the lower the heat. But it has to be high enough so that the blow has the effect of drawing the center as well as the outside. The packing heat is just below the refining heat. The refining heat is the lowest heat it will harden at. All heats must be uniform or even. To do this a good clean fire is required and the heats taken rather slowly; the steel to be turned over often in the fire and kept under the coals as much as possible. BERT HILLYER.

TIMELY TALKS WITH OUR SUBSCRIBERS

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The Boosters' League

We suggested it several years ago, and "Our Folks" have been boosting, too. There's no initiation fee, no membership, nothing but staunch, whole-hearted smiths who have given their word to BOOST, to challenge the knockers' statements and to BOOST, every chance they get. Are you a member? Better join. It won't cost you one penny; but if you live up to the motto, constitution, by-laws and rules of the league you'll be a better craftsman and the craft will be better for your being in it. The object of the league is to raise the standard of the craft, to get good men into it, to keep out the undesirable, to encourage the right kind of young men to come into and stick to the craft. And the constitution, by-laws, rules, regulations and motto are summed up in the simple word, BOOST, Are you a member of the B. L.?

More Readers

Do you know—if YOU and every other reader of this paper would secure just one other reader we would have very close to fifty thousand or more readers? Why not try this scheme in earnest? YOU do your part—get one other reader during the next week. Surely you know of one other smith who will find profit and pleasure in the pages of "Our Journal." If you cannot call on him personally, write him a letter. We'll repay you for your time and trouble. But do it this week—we are counting on YOU.

And if you send us a new subscriber, we'll give you six months' credit on your own account or we will send you a guaranteed fountain pen; a neat watch fob with your initial on it; a rubber stamp bearing your name, business and address, and an inking pad; a hoof knife or a bench level. Will you give us a chance to send you one of these presents? Remember, we are counting on YOU—THIS WEEK.

Contents, September, 1912

Send for More

When your supply of Pink Buffalo Stamps is low, send for more—don't hesitate one minute—send for more. They are free—they are plentiful—they are pink—they are protectors. Don't send out a letter to jobber, manufacturer or brother smith without a pink stamp attached. We've got lots of these pink squares and they're all ready to send out. All we need know is where to send them. They help you get a square deal—they show other folks that you are a live craftsman—they prevent others from getting goods in your name.

Profit from the Advertisements

If you pass over the advertising pages of "Our Journal" with little or no attention you are not getting full value out of the paper. The advertising pages are heaping full of valuable and practical information. You cannot spend too much time on them. There are opportunities in those pages that can be made to pay you dollars and cents in real money. And, best of all, you can depend upon the advertisers;—the "Honest Dealings" paragraph and the Pink Buffalo Stamps protect you.

Are you getting full value out of the advertising section? How are you making use of the advertising pages? Write a letter after going through this issue—or, if you prefer, answer the following questions. The main point, however, is to give us some information on how you get your money's worth out of the advertising section.

1.—Which advertisement in this issue do you consider best from your own viewpoint? Why?

2.—Which advertisement in this issue was first to attract your favorable attention? Why?

3.—What advertisements did you answer? Why?

4.—What articles advertised in this issue are you now using?

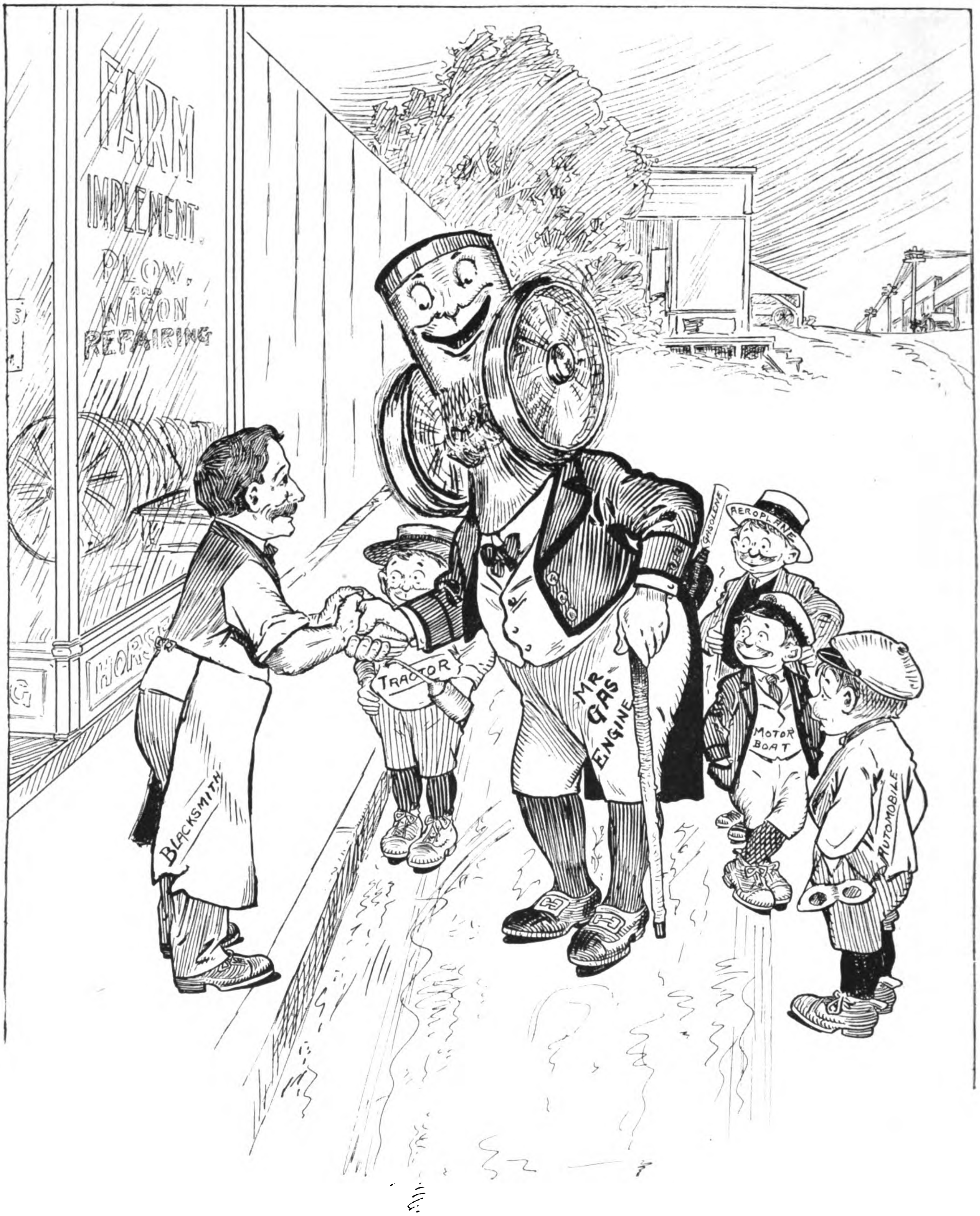
5.—What advertisements have influenced you favorably, i. e., what articles are you convinced you need and are going to purchase?

6.—What tools or machines are you using that are not advertised in this issue?

7.—How were you influenced in buying those tools, i. e., by a salesman or by advertising?

8.—How can the advertising section of "Our Journal" be improved?

Won't you let us have a letter from you along the lines suggested by the above questions?



Apologies to Farm Imp. News

MR. GAS ENGINE TO MR. BLACKSMITH:

"You've known me for some time, now I want you to get acquainted with my boys. That little fellow with the goggles is a sturdy chap and his brother here with the oil can is also growing bigger every day."

Shoeing and Treating the Interfering Horse Scientifically

E. W. P.

THE subject of treating interfering horses is very old, yet always new. For, no matter how much you read on the subject, no matter how many cases you master, there are always examples of interfering which will appear new to you. Interfering is presented to the everyday practice of the shoer in, it would seem, a thousand different forms.

Interfering is the result of any and all irregularities of gait or action which cause the animal to strike one leg or foot with another. There are a number of forms of interfering. They are known generally as: knee knocking; shin hitting, ankle hitting; cross firing; forging; overreaching; speedy cutting and scalping. And as each form of interfering usually requires different treatment it will be necessary to take up each in turn.

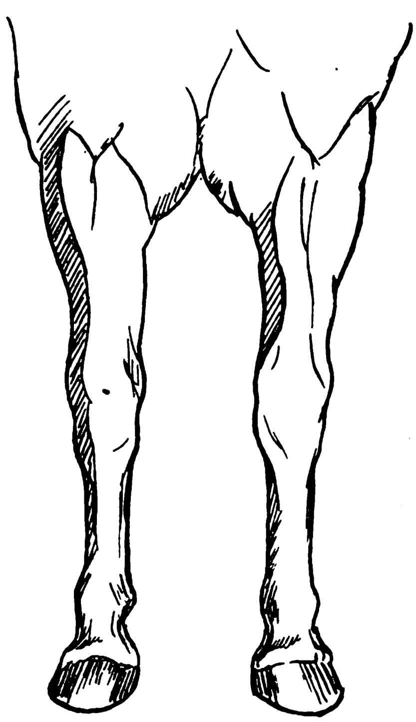


FIG. 1—THE NORMAL POSITION OF THE FRONT LIMBS

Knee Knocking

This, as the name indicates, is a form of interfering wherein the animal strikes the knee with the opposite foot. It may occur with only one foot or it may happen with both feet.

The cause may be faulty conformation of the limb, improper shoeing, or both. As a rule the knee knocker is a high stepper. He may be broad chested and toe wide or narrow chested with legs set close together. Or, again, the animal may have one or both pasterns twisted out, or he may be calf-kneed or one leg may be twisted while the foot of the other limb is toe wide. There may, in fact, be almost any combinations of faulty conformation, and when you begin to think you have had experience with all of them you'll run across another you've never seen before. A foot does not necessarily need to be greatly out of correct conformation to cause interfering. In fact a slight fault in the limb coupled with careless shoeing may cause an animal to interfere very badly.

The first thing to do then in correcting the knee knocking is to find out what causes the trouble. Question the owner of the animal; carefully examine the feet and limbs of the horse and also consider the wear on the old shoes where the animal strikes, and any and all other points that may have a bearing on the case. Go at the matter as you would any problem which may come up for solution. Get all the information you can.

If in questioning the owner or driver you learn that the animal has always interfered you may look for faulty conformation of the limb. If the animal is a green colt, and to all appearances correctly shod, don't experiment with the feet, as the animal is very likely to interfere anyway until he learns how to manage his feet. If the animal has been put to new work, that may account for his interfering. If driven in a team he may be improperly mated or may not be accustomed to a new mate. If the animal traveled clear before the last shoeing, the work may be at fault; though this does not always follow. The horse may be "out-of-condition"—may be overworked or may be worked too long between rests.

These suggestions will give you an idea of how to analyze the problem. There are other matters that have a bearing on the solution of the difficulty, but these will occur to you in the individual case.

FIG. 2—THE BASE-WIDE POSITION OF THE FRONT LIMBS

Now to shoe the horse correctly we must consider all of the points brought out in the analysis of the case. There is no need for "flim-

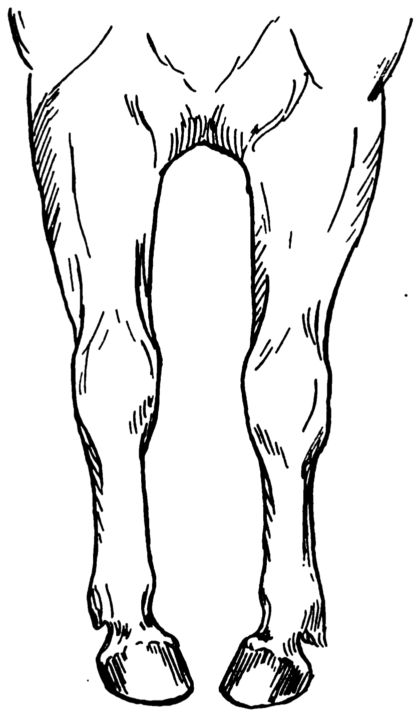


FIG. 3—THE BASE-NARROW POSITION OF THE FRONT LIMBS

flammery" in arriving at the correct manner of paring the foot, forging the shoe and nailing it on. If we will just consider all points in a common-sense way, just use our grey matter and think, we cannot help but apply the sensible and therefore the correct remedy.

Let us consider these points for example: If an animal's limbs drop from his body like the uprights of an A, how would you naturally suppose the hoof should be pared? Doesn't it sensibly follow that the correct method of balancing that foot would be to cut down the inside or to build up the outside of the feet?—Level the foot. But you cannot level the foot unless you pare the horn according to the limb above it. A plumb line dropped from the center of the upper leg should strike the center of the toe of the foot. If the limbs are closer at base or hoof than at shoulder, the outside should be pared or the inside built up.

The knee knocker, contrary to the ideas of some shoers, should be shod as light as possible, bearing in mind the work for which the animal is used. On the foot WITH which the animal strikes we want a shoe which will throw that foot out and away from the knee which he has a tendency to hit. Therefore, if the limb above the striking foot is base-narrow (closer to its fellow at base than at shoulder), use a shoe as shown in the engraving, Fig. 4, A. This shoe, as will be noted, is rolled on the outer toe, while the inside toe carries a calk. If the limb of the striking foot is base-wide, have the inside of foot low and use the shoe as shown at B. If both limbs are wide at base and the animal strikes both knees, roll the outer toes of both shoes and use inside weights, see Fig. 4, C.

These are by no means the only shoes that may be used in correcting knee hitting. You will need to devise special shoes to meet special cases; and you will sometimes find that a certain shoe used with success in one case will not operate equally well in a similar case. You must make the shoe and treatment fit the horse in more ways than one.

Shin Hitting

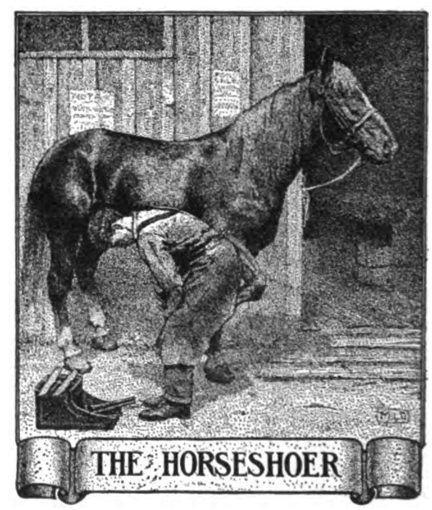
Shin hitters strike the cannon or shinbone with the opposite foot. Usually but one leg is affected, though both may be. Sometimes the animal will strike the shin with one foot and the fetlock with the other foot.

The shin hitter may have both limbs toe-wide, or one leg toe-wide and the other calf-kneed, or both legs may be calf-kneed.

To remedy the difficulty, study the case as carefully as possible, getting all the information you can that has a bearing on the treatment. The general rule of paring down the outside of base-narrow feet and the inside of base-wide feet applies generally in the treatment of the shin hitter also. Take an actual case where the animal is calf-kneed in the right leg, while the left is toe-wide; the left foot should be high on the inside with the outside quarter rolled. The shoe shown at A, Fig. 5, is applied. On the right foot apply the shoe shown at B, leaving the outside of the foot high. The shoe should be fitted close at X Y and the hoof rasped away at this point until it conforms to the shape of the shoe. Sometimes all that is necessary to cure the shin hitter is a light shoe with an outside weight to throw the foot sideways when traveling fast. Such a shoe is shown at C, Fig. 5.

Should a case be extremely difficult of solution—or should you be in doubt as to the conformation of the limbs (and it sometimes takes a very sharp eye to discover the fault), remove the shoes and rasp the edge of the wall so as to leave a round edge that will not chip or split off. Have the owner use the horse for a few days over dirt roads, examining the feet carefully each day for wear and chipping. Should the animal travel clear without shoes, you may be certain that you can make him travel correctly with shoes; provided you add merely enough metal to protect the feet and yet not overburden the limbs; and in that case do not pare away any horn. Let nature make her own bearing surface. And remember it in future shoeings, when the hoof has a chance to grow, because of the protection of the shoe.

(To be continued)



Shoeing the Horse Correctly—7

J. C. WEAVER

Diseases of the Foot

Many of the diseases of the horse's foot have been treated under other titles in this series. Those that are now taken up to give these articles a fitting close are the diseases that have not been touched upon, but which the shoer must needs know something about if he is to become a practical horseshoer in the broad sense.

Calk Wounds

These are common enough, perhaps all too common, when it is considered that incorrect shoeing is the usual cause. In treating the trouble, boots should be applied when the animal is worked. To heal the wound, wash thoroughly with cold water to which two ounces of

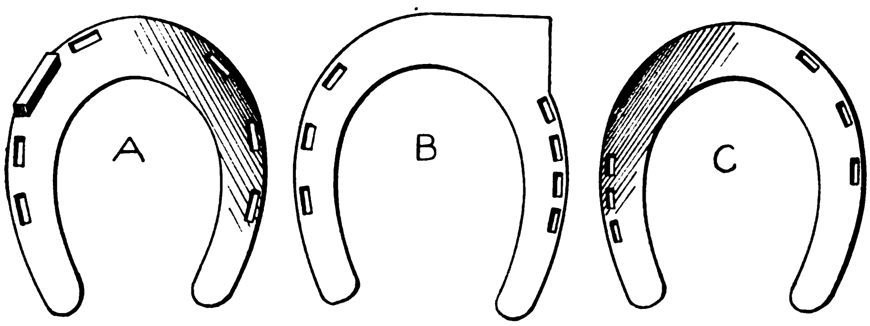


FIG. 4—THE SHOES FOR STOPPING KNEE KNOCKING ARE SHOWN HERE

sulphate of iron have been added to each gallon of water. Then dry the wound and bandage it, using a good salve or, if nothing else is at hand, lard or tallow will do.

Canker

Canker is caused by dampness. It may be and usually is confined to one foot, though all of the feet may be affected. Lameness, watery discharge and offensive smell are the more apparent evidences of the disease. Treatment consists of cleaning the foot thoroughly with warm baths and the application of a poultice of powdered charcoal. The diseased and decaying portion of the hoof should be removed and a broad, plain shoe applied. After shoeing, apply a stimulating dressing to encourage the growth of healthy horn, renewing the bandages as often as necessary.

Thrush

This is commonly caused by unclean stables and is usually detected by the excessive moisture in the cleft of the frog, the offensive odor and the watery discharge. First and foremost in its treatment is the removal of the cause, as no amount of treatment will cure if the cause is not removed. The frog should be thoroughly cleaned, diseased parts removed and a boiled turnip poultice, to which a handful of powdered charcoal has been added, should be applied. After a couple of days, remove the poultice and fill the cleft of the frog with dry calomel, and bandage the foot with oakum for two or three days. Change the bandage often if the discharge is profuse. When the horse is again shod use high calks until the diseased foot is entirely healed, when an ordinary shoe should be used.

Punctured Wounds

Wounds of the foot are frequent in the horse, and every shoer, handler and user of horses is more or less familiar with their treatment. It is important, however, to give these wounds and punctures prompt treatment and not allow them to develop into something more serious. There is always this danger, especially when one considers the ease with which serious infection may be promoted by reason of the dirt and filth with which the animal comes into contact even under the best of conditions.

For shallow wounds, a thorough cleaning and the application of an antiseptic healing salve will usually suffice, with a renewal of the dressing every day. But for deep wounds, cuts and punctures more care must be exercised. In such cases a clean opening should be made for the escape of pus, and the wound thoroughly cleaned to its very bottom. If inflammation is present a poultice should be applied until the inflammation has subsided. Then apply antiseptic dressings that will keep the wound clean and free from infection and allow it to heal of its own accord.

Quittor

This disease is usually divided into several classes. Simple quittor makes itself apparent by lameness in the affected foot, and after three or four days a small tumor will appear in the coronary region. The foot may then become very much swollen and the lameness so intense as to cause the animal to refuse to use the diseased limb. The treatment consists of bathing and washing the leg and careful drying. If the tumor has started to suppurate, hasten suppuration by applying a linseed meal poultice. The tumor may be cut to relieve the pain of pressure and the pus carefully squeezed out. Now place the foot in a warm bath for half an hour and then poultice it for two or three days. Now apply a healing dressing until the wound is entirely healed.

Sub-horny quittor will usually succumb to the same treatment if attended to in time.

Tendonous quittor is usually an advanced stage of the simple form. The swellings or tumors may number as many as six or seven. As they open, the pus or discharge should be squeezed out. If these openings

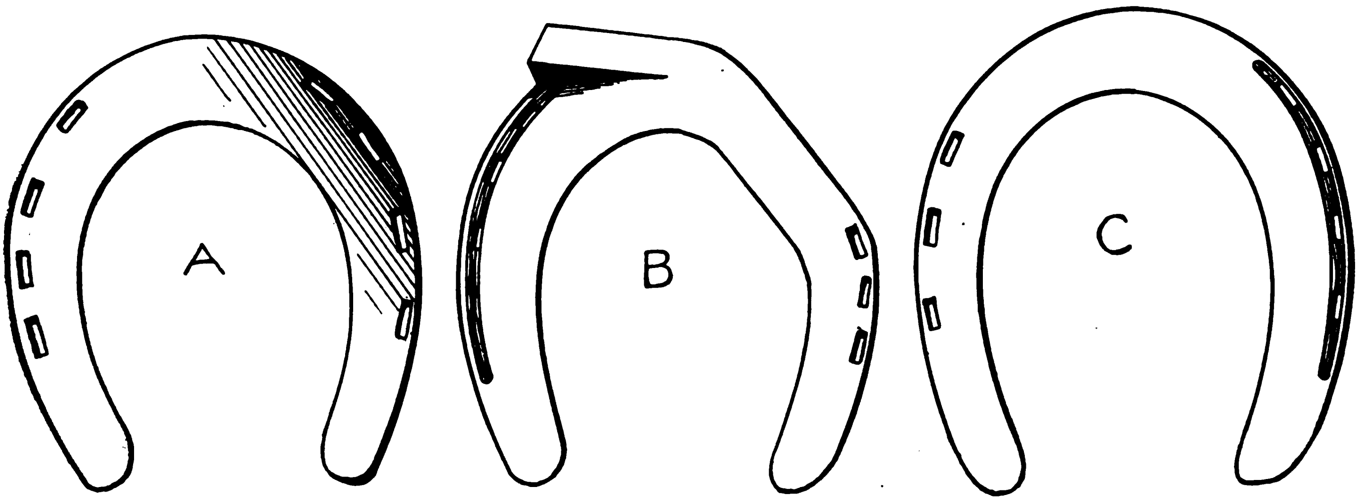
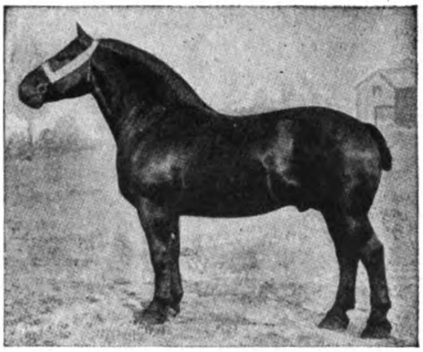


FIG. 5—SEVERAL SHOES TO STOP THE SHIN HITTER FROM CONTINUALLY INJURING HIMSELF



A CHAMPION BLACK PERCHERON OF EXCELLENT BUILD

are probed they will be found to lead toward the sole, where openings should be made to allow for perfect cleaning and washing. When the discharge becomes healthy, a carbolic solution should be injected and every assistance given for a healthy closing of the wounds.

The last form of quittor known as cartilaginous quittor affects the cartilages and had best be left to the expert surgeon for treatment.

Contracted Heels

The symptoms are familiar to all horseshoers, though the cause of the trouble is many times in dispute. Perhaps the most common cause is faulty shoeing and ignorance on the part of the shoer. To correct this condition, soften the feet by means of poultices or by standing the horse in water for a time. The shoes should have no calks and the frog and hoof given every possible chance to grow and spread. A shoe recommended by many shoers is one with the heel branches beveled so as to forge the heels of the foot apart. Another method of correcting contracted heels if the horse is not doing very heavy work is to apply a toe tip to the affected feet, allowing the heels to touch the ground. If the horse can be turned out upon a damp field or a pasture adjoining a marsh or creek, a cure will be effected so much quicker.

Navicular Disease

This is an inflammation of the sesamoid sheath. Treatment is seldom successful, though if treated in the early stages the trouble may be corrected. Rasp the wall of the heels until very thin. Blister the coronet with Spanish fly ointment and turn the animal out on damp ground. Repeat blister every three weeks and continue treatment for about three months. Shoe with plain footwear and work the horse lightly if at all.

Ringbone

Treat with cold baths and wet bandages if tumor has not yet made itself apparent. If the bony growth has started, the firing iron should be used. Cases are not always susceptible to treatment, though shoeing may make the animal serviceable. If the animal walks with the toe on the ground he should be shod with a high-heeled and a low-toed shoe, while if he walks on his heels, a thin-healed and high-toed shoe should be used.

Laminitis

Laminitis is an inflammation of the sensitive laminae. The symptoms are lameness, quickening of the pulse and rising temperature. Intense pain is apparent from the animal's facial expression, and more or less perspiration is present. The affected feet are hot and dry and when tapped great pain is caused.

The animal should be carefully protected from sudden changes either in temperature or work. He should be protected from drafts and properly clothed when placed in the stable. Give the animal warm drinks and bathe the feet first with warm water and then with cold water. In acute cases give large doses of nitrate of potash and continue the cold bathing of the feet. The shoes should be removed in the early stages of the disease and no paring of the hoof done.

Cracks

These are generally known as toe-cracks and quarter-cracks and may be cured by the practical shoer in any one of several ways. First apply a good hoof ointment or liquid to keep the horn soft and supple. A damp floor in the stall will also aid in softening the hoof. Then attempt as far as possible to prevent all movement of the edges of the crack. This may be done by attaching a light plate of brass over the crack and holding it by means of screws, or a hole may be drilled through the horn and across the crack and a light, tough nail inserted and clinched so as to pull the edges of the crack together. Other means of holding the edges may also be used, but whatever means are used it should be borne in mind that the object is to simply hold the crack edges rigid and not attempt to make them grow together, which is impossible. To eleminate the crack it is necessary to cause a healthy growth of new horn. Any ointment or preparation that will promote the growth should be included in the treatment.

Recipes

Hoof liniment for dry feet, hard feet, hoof-bound and tender feet. This is an excellent liquid for foot troubles. It penetrates the horn quickly and will often cure lameness after one application. To make it, take a half pint of linseed oil; twelve ounces oil of thyme; four ounces of turpentine and six ounces of creosote. Mix these ingredients thoroughly. For hoof-bound, apply around the top of the hoof every other day; for cracks, apply every day.

A good liniment for use on sores, swellings, sprains and other troubles of like nature is made by taking equal parts of turpentine and linseed oil, and to each pint of the mixture add one ounce of tincture of iodine and four ounces of ammonia. Shake and mix thoroughly before using.

The Art of Horseshoeing in Austria

D. C. Slocum

The Austrians claim that the art of horseshoeing has been brought to a higher degree of perfection in their country than in any other country in the world. True, the art is one of great antiquity in their country, but are there not other countries where horseshoeing has been practiced as long or longer? Why then this claim of perfection? The answer is found in the number of horses raised; the great numbers

A COLORADO SHOP OF CEMENT AND FRAME CONSTRUCTION

used, and the beauty and excellence of the animals as a whole. And behind these matters that are apparent to the observer are the courses of horseshoeing instruction in the manual training schools, the military schools and the many books by Austrian writers on the subject of horseshoeing and kindred subjects.

The trade is controlled by a guild, admission to which requires an apprenticeship of from two to four years.

The equipment of the shops is very similar to those of the United States, though the buildings themselves will average much better. The shops are usually built of brick or stone, and power is generated either by water or electric motors, or by benzine motors which are similar to the American gasolene engine. In the larger shops the bellows has been replaced by the blower and this is usually operated by electricity. Then, too, these shops use such modern machines—welding machines, shoeing machines, tire furnaces, emery wheels, lathes and various other special tools.

The welding machine is a device for forcing the heated ends of iron and steel pieces together. Thus tires, axles and similar parts are welded by pressure instead of by pounding on the anvil.

A Horseshoe Punch

Wm. V. Gist

The engraving shows my latest invention; a machine for punching out holes in factory-made horseshoes without heating. It saves time, labor and coal. It has an oil cup to oil the punch to prevent heating and wear. I have punched over 500 shoes with one bit.

Cutting Out the Guesswork in Business

A. M. Burroughs

The owner of a little drug store in San Francisco decided that there must be a reason for his store remaining small while other stores were getting big.

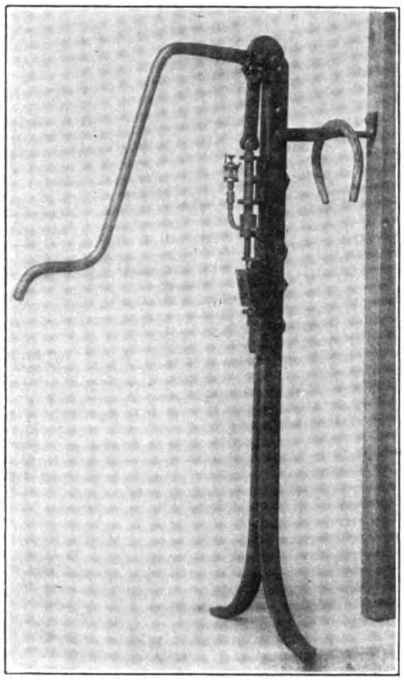
He set himself the task of finding the reason; of finding why it wasn't paying him; of finding what he needed to know to make it pay him the big profits he knew it ought to pay him.

He found the reason: Now, instead of owning one little drug store, he owns seventeen big drug stores.

Now, he owns a fine automobile and a fine home. His check is good for anything he wants—he is making all kinds of money.

The United Cigar Stores Company, with its hundreds of stores and millions of capital, started from an "Analysis" of one little cigar store in Syracuse, N. Y.

If the owner of that little cigar store hadn't looked for and eliminated the weak places, he and his brothers would never have built up the wonderful chain of stores which he now directs.



A MACHINE FOR PUNCHING HORSESHOES

He asked himself what he needed to know about the business to eliminate the blunders; to make every move count for bigger profits.

By making his records show him what cigars had sold, he was soon able to buy cigars that sold better.

By making his records show him what cigars had not sold, he cut out the bad buying—the stocking up of cigars that he could not sell.

He found out how many smokers passed his store every day. Then he moved his store to a corner where ten times as many smokers passed it every day.

He made his records show which of his clerks sold the most cigars at the best profits. Then he studied the methods of the best clerk and got more like him and less of the other kind.

He studied the attitude of his clerks towards the smokers who came back, and towards those who didn't come back. Then he changed the attitude of the clerks so that nearly all smokers came back.

He counted the seconds necessary to serve each smoker at the rush hour. Then he cut off half the seconds, with little tricks of shortening steps. He arranged his display cases and his boxes so each clerk could reach every box from where he stood.

He counted the steps each smoker had to take inside the store. Then he arranged his display cases to cut out every unnecessary step.

He made it possible for each smoker to get a cigar while waiting for a car, hurrying to work or to keep a business engagement.

The best cigars, the best clerks, the best store, all managed in the best way, laid the foundation for a chain of a thousand stores—for a corporation of many millions of dollars.

And the man who analyzed himself and his opportunities in that little Syracuse store now directs that chain of a thousand stores.

A grocer in one of the suburbs of Boston was having a pretty hard fight with competition. The big Boston stores and two or three other live stores in his own town were getting the lion's share of the business.

For eleven years he floated along, "wondering" how he could make more money.

At last things began to get so warm that he began to wake up and do more than just "wonder."

He decided he had to find out why those big Boston stores were coming out into his territory and taking away his business, while he was rapidly sliding down hill into the waiting arms of the sheriff.

These investigations were a revelation to him. He found that he was not the only retailer in danger of bankruptcy. He found that 95% of all retailers were just barely existing and being gradually forced out of business, while a bare 5% were really succeeding.

Then he began to study the methods of the 5% who were succeeding. He found that those stores didn't use the hit and miss guesswork methods used by unsuccessful retailers.

They were running their business from positive knowledge.

"Then and there," he says, "I decided that I would govern my business from positive knowledge rather than from accepted customs.

"I first asked myself what I wanted to know, and decided as follows:

"Which lines show a profit and how much?

"What does it cost to obtain that profit?

"Are my clerks earning more or less than I am paying them?

"Are there any leaks, and if so, where?

"My bookkeeping system, which I thought was the real thing, didn't answer these questions, so I resolved to have one that would."

He got a system which gave him, is now giving him, the information he needed.

Then he found out how his business really stood. He learned what he needed to know to make himself a big manager.

He was able to bolster up the weak places, cut out the lines which were showing a loss, increase the lines which produced a profit, drop the clerks who were no good—to do the things which paid.

(Copyright by Burroughs Adding Machine Co.)

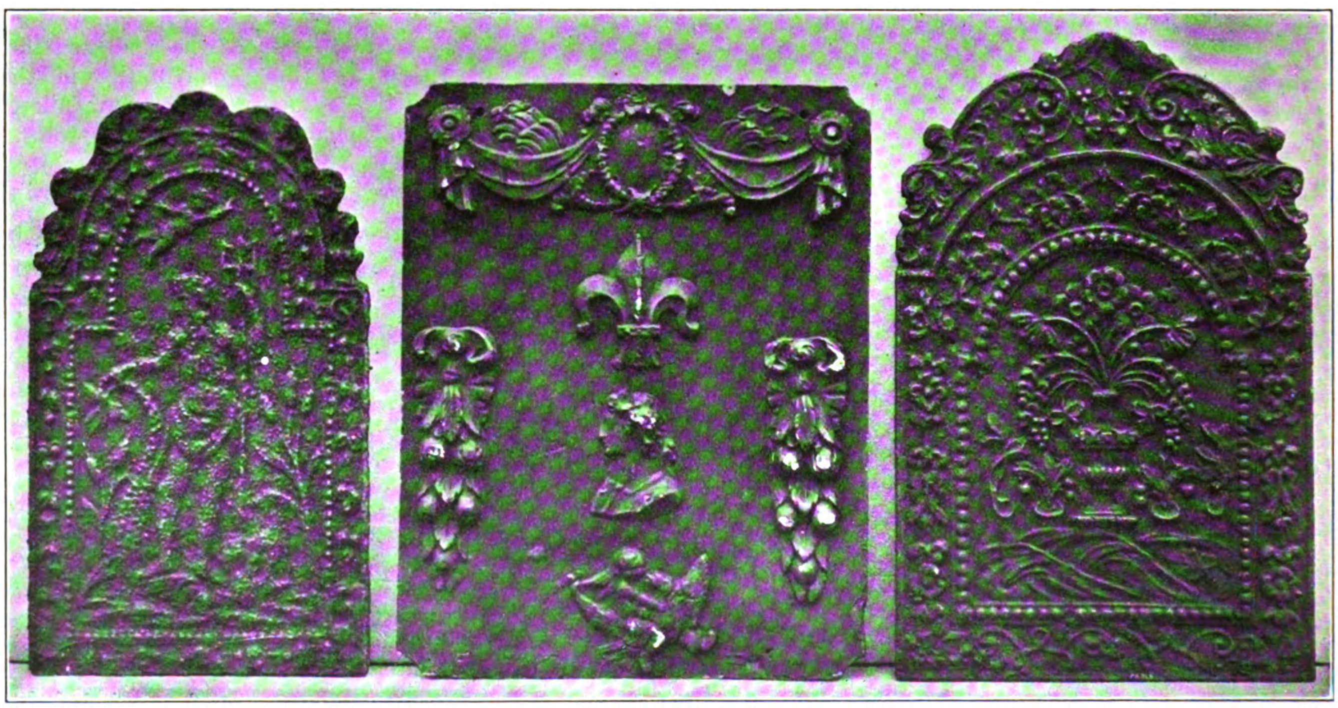
Examples of Ancient Iron-Casting and Iron-Forging

The engraving showing the three plates illustrates to what extent the early iron founders were acquainted with their art. The two end pieces are cast-iron firebacks. The center plate is part of a lead cistern.

Firebacks were the first articles that the early founders attempted to cast; these plates were usually more or less ornamented and some show the result of real ability both in design and workmanship.

The second engraving shows a number of examples of hand forged work of the 17th Century. Here are shown hinges, doorplates and escutcheons in a variety of shapes and designs. Practically every one of these examples is pleasing in design, and certainly all of them show that their makers must have been masters of considerable skill. If the reader is a close observer he will notice that beside being examples of excellent design many of the pieces are embossed in a way that will rival similar work done by the smith of today. A comparison of the flat work with the embossed pieces will readily demonstrate how much better the raised work shows up.

To get an idea of how much real ability these old smiths possessed, just try to copy one of these pieces during your spare time. And when you have finished the piece just consider that the old time smith made hundreds of such pieces; very often originating the design, smelting his own metal, and without the use of many of the modern tools which you have today.



EXAMPLES OF EARLY IRON AND LEAD-CASTING—SOME OF THE FIRST ARTICLES CAST IN IRON WERE FIREBACKS SUCH AS SHOWN ABOVE

Meeting Competition-5

A Series of Talks on Common-Sense Ways of Meeting Fair and Unfair Competition

By THORNTON

There are ways and means of meeting competition about as numerous as there are ways and means of shoeing an interfering horse—about every other shoer has a different method. And some of the ways of meeting competition are open and visible to your competitor, while other methods are not. Don't misunderstand—I don't mean that the other methods are "shady." I mean that your competitor has less chance of knowing about them.

For example: Your competitor advertises certain work for a certain price, which is below what

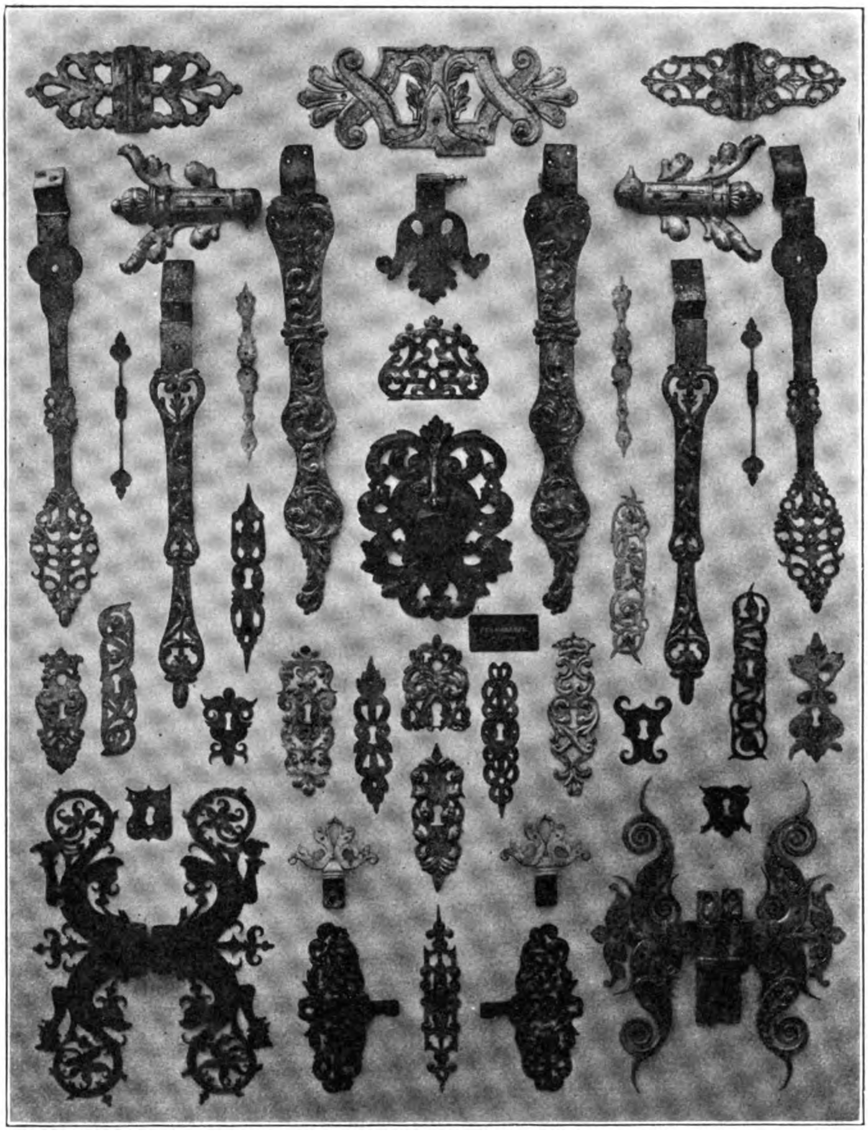
you have been charging. To meet that competition you advertise in the same paper that you can supply the same thing at the same price if people want it. That lets your competitor know immediately that you are "coming back at him." But a better way, in my estimation, is to "get back at him" without letting him know it. How can you do it? Send your advertising by mail to your own and your competitor's customers to whom you think such things are likely to appeal. Of course he will know what you are doing, sooner or later, but he will not know how strong you're going into it.

And while on the subject of using Uncle Sam's mail for building up business let me say that here at our shop we have used the mail when we couldn't afford to use the local papers or to have circulars printed. If you will keep your eyes and ears open you can always make use of a two-cent stamp with profit. For example: Suppose you see one of your customers going into your competitor's shop with some work. Why not write him a very courteous letter and ask him why you haven't gotten any of his work lately? Don't, unless you know him very well, refer to his call at your competitor's, but write him a good letter about what good service and good work you can give him.

When you learn that a certain customer will be in the market for certain work, or for some machine that you can supply, make a note of it together with the time at about when he wants it and then let him hear from you occasionally. If you are selling a line of implements, and you hear that Mr. Smith over at the Corners is in need of a rake or plow, make a note of it on a card, keep the card in a box and write letters to Mr. Smith at regular intervals until you land his order.

And if you keep your eyes wide open and your ear "to the ground" you'll soon have quite a collection of cards in that box. The postage won't amount to very much—at least you'll hardly feel its cost, because if you plan the work right you'll write a few letters every day to a certain part of that list. Thus you will write a letter to each prospect on your list about every 20 or 30 days.

Nor is it always necessary to write a long letter. The occasional use of postcards is an excellent means of keeping your name and business before prospects. When you've got a new machine, say an electric blower, or a new drill or a tire setter, master every detail of the machine first, then drop a postcard to your best customers; invite them to see the new machine, and then demonstrate it. That will set them to talking about you, and that is just what you want.



HAND FORGED HINGES, DOOR PLATES AND ESCUTCHEONS OF THE SEVENTEENTH CENTURY

Before closing these talks on meeting competition, let me say that it isn't always well to wait and see what your competitor is going to do before you do anything yourself. Sometimes it is best to make your competitor do the meeting, though not in a price-cutting way. That is something I do not favor. A man's real reason for being in business is the money he can get out of it. When he offers his work or goods at less than he should, with no other reason than to cut his competitor's prices, he is forgetting his reason for being in business. He harms not only his neighbor's business, but his own as well.

And now just a word—don't forget that quality correctly presented will get and hold more good customers than price. Let quality not price be your trade and business motto. •

Wheel Heights and Tire Widths and How They Affect Draft and Road—2

Height of Wheel

The following summary of tests made in 1901 by the Missouri Agricultural Experiment Station upon

the "Influence of Height of Wheel on the Draft of Farm Wagons" may be of interest to the reader in connection with the tire discussion.

Numerous tests of the draft of wagons equipped with wheels of different height have been made at this station during the past three years. The trials were made on macadam, gravel and earth roads in all conditions, and on meadows, pastures, cultivated fields, stubble land, etc.

The draft was determined by means of a Giddings Self-Recording Dynamometer. The net load was in every case the same, viz., 2,000 pounds. Three sets of wheels of different heights, all with six-inch tires, were used, as follows:

Standard, front wheels, 44 inches; rear wheels, 55 inches.

Medium, front wheels, 36 inches; rear wheels, 40 inches.

Low, front wheels, 24 inches; rear wheels, 28 inches.

The following is a summary of the results:

1. For the same load, wagons with wheels of standard height draw lighter than those with lower wheels.

2. The difference in favor of the standard wheels was greater on road surfaces in bad condition than on good road surfaces.

3. Low wheels cut deeper ruts than those of standard height.

4. The vibration of the tongue is greater in wagons with low wheels.

5. For most purposes wagons with low wheels are more convenient than those of standard height.

6. Wagons with broad tires and wheels of standard height are cumbersome and require much room in turning.

7. Diminishing the height of wheel from 36 to 30 inches in front and from 44 to 40 inches in the rear did not increase the draft in as great proportion as it increased the convenience of loading and unloading the ordinary farm freight.

8. Diminishing the height of wheels below 30 inches front and 40 inches rear increased the draft in greater proportion than it gained in convenience.

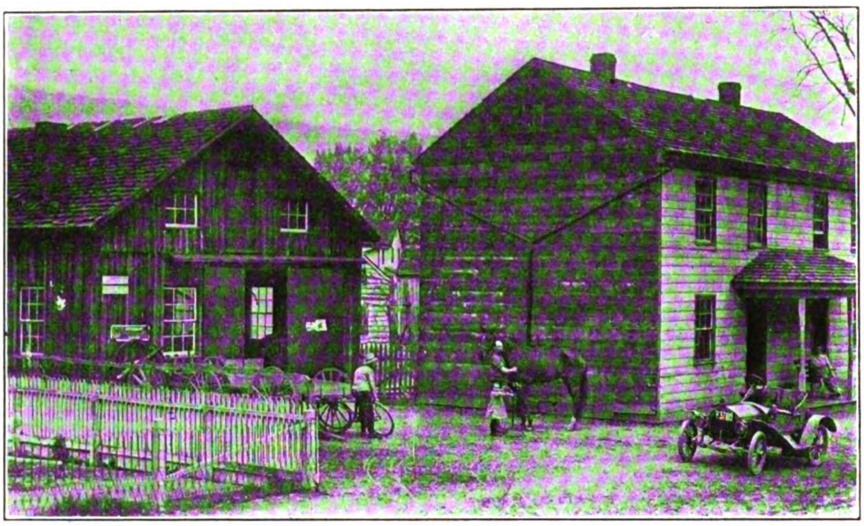
9. On good roads, increasing the length of rear axle so that the front and rear wheels will run in different tracks to avoid cutting ruts, did not increase the draft.

10. On sod, cultivated ground and bad roads, wagons with the rear axle longer than the front one drew heavier than one having both axles of the same length.

11. Wagons with the rear axle longer than front one require wider gateways and more careful drivers, and are on the whole very inconvenient and not to be recommended for farm use.

12. The best form of farm wagon is one with axles of equal length, broad tires, and wheels 30 to 36 inches high in front and 40 to 44 inches behind.

NOTE: This report of the tests made by the Missouri Agricultural Experiment Station should prove both interesting and valuable to our readers. It should be especially interesting to those who took part in the discussion, some time ago, in which the draft power necessary to pull wheels of various sizes over similar obstructions was questioned. A careful reading of this report will give the vehicle worker an idea of the relations of wheel heights and tire widths to draft and road.



THE SHOEING AND GENERAL SHOP OF MR. C. M. BENDER OF PENNSYLVANIA

Gasoline and Alcohol Tests on Internal-Combustion Engines

ROBERT M. STRONG

The following is a general synopsis of the results obtained and the general conclusions following a series of 2,000 tests conducted by the technologic branch of the United States Geological Survey at St. Louis, Mo., and at Norfolk, Va. The tests dealt primarily with gasoline; forming part of the investigation of mineral fuels provided by Acts of Congress. To determine the relative economy and efficiency of gasoline it was compared to denatured alcohol.

In order to determine and eliminate the affecting engine conditions as far as possible, the investigation was commenced by making comparative gasoline and alcohol tests on the same engines. These tests were repeated on other engines of approximately the same size and speed, having different degrees of compression, different methods of governing and different carburetors. The final report will include much material that may be of use in engine design, but that side of the investigation was not pursued any further than was necessary to obtain the best possible results for alcohol and for gasoline with the engines at hand and to prove that the minimum fuel-consumption rate for each could be obtained in approximately the same manner. The effects of engine and of operating conditions both have a bearing on the commercial deductions, but will be discussed only in a general way at this time.

General Statement

Gasoline and alcohol engines are built and operated on exactly the same principles and the action of the two fuels is relatively the same. Explosive mixtures of the vapors of gasoline and of alcohol with air are formed in the same manner and the subsequent burning of these explosive mixtures in the engine cylinder takes place in a similar way and with similar results.

Gasoline Engines Run With Alcohol

Almost any gasoline engine with a well-designed carburetor will run as

well with alcohol as with gasoline, from the standpoint of operation, except for a difference in ease of starting and in certainty of operation at low speeds. Under conditions requiring widely varying speeds the engine is less certain to operate satisfactorily at very low speed when alcohol is used, unless some special adjustment is made. The only change required for the use of alcohol in a gasoline engine, if any, is in the size of the fuel passageways. The fuel needle valve must be capable of being opened twice as wide for alcohol as is required for gasoline, and the spray nozzle must not be restricted to just the size that is required to supply the needed quantity of gasoline. The fuel passageway in a carburetor can usually be easily drilled out, and so far as producing power at constant speed is concerned the engine will be just as serviceable with either fuel. This change need not be such as to affect the consumption of gasoline, but with this change alone the consumption of alcohol will be from one and a half times to twice as much as the consumption of gasoline for the same power.

Synopsis of Results and General Conclusions

1.—The low heating value of completely denatured alcohol will average 10,500 British Thermal Units per pound, or 71,900 B. T. U. per gallon.

The low heating value of .71 to .73 specific gravity gasoline will average 19,200 B. T. U. per pound, or 115,800 B. T. U. per gallon.

The low heating value of a pound of alcohol is approximately six tenths of the low heating value of a pound of gasoline.

A pound of gasoline requires approximately twice the weight of air for complete combustion as a pound of alcohol.

The heating value of a cubic foot of an explosive mixture of alcohol vapor and air having theoretically just sufficient air for complete combustion is approximately equal to that of a cubic foot of a similar explosive mixture of gasoline vapor and air—about 80 British Thermal Units per cubic foot.

2.—Explosive mixtures of alcohol vapor and air can be compressed to much higher pressure in an engine cylinder without preigniting than can explosive mistures of gasoline vapors and air. The maximum pressure of compression that can be used without causing preignition will in each case depend partly on the quality of the explosive mixture, on the design of the engine and the speed at which it is operated.

For 10 to 15 horsepower four-cycle stationary engines of the usual type a compression pressure of about 70 pounds per square inch above atmospheric was found to be the maximum that could be used for gasoline mixtures, and about 180 pounds the maximum that could be used for alcohol mixtures without causing preignition.

The maximum compression pressure that could be used without causing preignition was in each case found to be the most advantageous from the standpoint of fuel economy.

3.—When the degree of compression is in each case that best suited to the economical use of the fuel designated, some types of gasoline engines are better adapted to the service for which they are designed than similar alcohol engines, and vice versa. The relative amount of fuel consumed being disregarded, this is also true when the degree of compression is that ordinarily used for gasoline mixtures, as when denatured alcohol is used in gasoline engines; but in general the alcohol engine is or can be so designed and constructed as to be equal to the gasoline engine in adaptability to service.

A gasoline engine having a compression pressure of 70 pounds, but otherwise as well suited to the economical use of denatured alcohol as gasoline, will when using alcohol have an available horsepower about 10 per cent greater than when using gasoline.

THE HORSE BEARS A MOST IMPORTANT PART IN THE NATION'S AGRICULTURAL WORK

When the fuels for which they are designed are used to an equal advantage, the maximum available horsepower of an alcohol engine having a compression pressure of 180 pounds is about 30 per cent greater than that of a gasoline engine having a compression pressure of 70 pounds, but of the same size in respect to cylinder diameter, stroke and speed.

When denatured alcohol is used in 10 to 15 horsepower four-cycle stationary engines having a compression pressure of approximately 180 pounds, and the engines are operated at their maximum loads, the pressures during explosion or combustion reach 600 to 700 pounds. Stationary gasoline engines, in which the compression pressure in some cases can be raised to 180 pounds, are not usually built heavy enough to withstand such explosion pressures for any length of time.

4.—A gasoline engine having the degree of compression ordinarily used for gasoline mixtures will in general require 50 per cent more denatured alcohol than gasoline per brake horsepower per hour.

Gasoline and alcohol engines of similar construction having degrees

of compressions best suited to the fuel supplied will in general require equal volumes of gasoline and denatured alcohol, respectively, per brake horsepower per hour.

Gasoline engines of the usual four-cycle stationary type will ordinarily consume about a pint of gasoline per brake horsepower per hour when operated at about rated load and with a reasonably favorable adjustment of the mixture quality and time of ignition.

When carrying light loads, or carrying their maximum loads, gasoline and alcohol engines governed for constant speed require a greater quantity of fuel per brake horsepower per hour than when carrying their rated loads, if rated at about 75 to 80 per cent of their maximum loads; but unless the mixture quality and time of ignition are adjusted to suit each change of load, the rate of consumption per brake horsepower per hour will in general be least at maximum load and will increase with decrease in load.

When any of the usual methods of governing are used to control the speed of gasoline or alcohol engines, the rate of fuel consumption per brake horespower per hour will ordinarily be about twice as great at one third load as at maximum load. At the same time an excessive rate of consumption of gasoline or denatured alcohol at any given load, if due to the incorrect adjustment of the mixture quality and time of ignition only, may be as great as but not greater than approximately twice the minimum required before it will be noticeable from outward indications.

THE SHOPS OF E. M. BUGBEE OF MASSACHUSETTS, WHERE A GENERAL SMITHING BUSINESS IS CARRIED ON

5.—The thermal efficiency of alcohol and gasoline engines will in general increase with the pressure to which the charge is compressed when ignited.

The maximum thermal efficiency of 10 to 15 horsepower four-cycle stationary engines of the usual type when operated with a minimum amount of throttling was found to increase with the compression pressure according to the formulas $E=1-(\frac{14.7}{P})^{.17}$ for gasoline and $E=1-(\frac{14.7}{P})^{.9}$ for alcohol, where E=the thermal efficiency based on the indicated horsepower and low heating value of the fuel and P= the indicated pressure of the charge at the end of the compression stroke in pounds per square inch absolute.

6.—A high thermal efficiency and a rate of consumption of less than a pint per brake horsepower per hour, both for gasoline and for denatured alcohol, can often be obtained when the degree of compression, the load, the quality of the explosive mixture and the time of ignition are carefully adjusted.

7.—When, by means of a double carburetor, gasoline and alcohol are used simultaneously in varying proportions from practically all gasoline to practically all alcohol, the most advantageous degree of compression will vary from that found to be the best for gasoline mixtures to that found to be the best for alcohol mixtures.

Tests that were made with such an adjustment of compression indicate that the total amount of fuel (gallons of gasoline plus gallons of denatured alcohol) required for any given load is practically constant for the entire range of proportions from all gasoline to all denatured alcohol.

8.—When water is sprayed into an explosive mixture of gasoline vapor and air as it is being taken into the cylinder of an engine, and is introduced at the most advantageous location, it may in many cases be supplied in amounts up to as much water as gasoline by weight without affecting the performance of the engine, except as noted below.

The capacity or maximum available horsepower of an engine decreases with an increase in the percentage of water, by weight, present in the explosive mixture of gasoline vapor and air.

When used in an engine having a constant degree of compression, the presence of water in an explosive mixture of gasoline vapors and air in quantities equal to or less than the weight of gasoline does not increase or decrease the amount of gasoline required to carry any given percentage of the corresponding maximum available load.

The pressure to which an explosive mixture of gasoline vapor, water and air can be compressed in an engine cylinder without preigniting increases with an increase in the percentage of water in the mixture, and can be raised to about 140 pounds when the weights of water and gasoline are equal.

That the amount of gasoline required is not affected by an increase in the compression pressure when preignition is prevented only by the introduction of water as above stated is indicated by the results of tests made on an engine having a compression pressure of 130 pounds. These tests are limited, however, and the results are not conclusive.

(To be continued)

Opportunities

Here are listed a number of live opportunities for live blacksmiths—towns and localities where blacksmiths are needed. If you want to start anew and if you have the necessary energy, skill and perseverance to stick to business until business sticks to you, get into touch with these business chances. Write to the man or firm named under each address.

Montana—

At Hunter's Hot Springs—Address Postmaster.

At Wooldridge—Address C. A. Janzow.

At Rexford—Address Postmaster.
At Silverbow—Address Chas. Newquist.
At Cooke—Address Nels E. Soderholm.
At Springdale—Address Wm. Muir.
At McLeod—Address Postmaster
At Java—Address Postmaster.
At Lothair—Address Boger Merc. Co. This is said to be a "good opening."
At Corbin—Address Postmaster.

Nebraska—
At Ruby—Address H. Davis, Milford, R. 4.
At Southbend—Address Postmaster.
At Abbott—Address Peter Todsen. One badly needed here.
At Ayr—Address H. A. Howe.

New Hampshire—
At Newburg—Address E. C. Leor.
At West Nottingham—Address Postmaster.
At Jaffrey—Address F. H. Chase.
At Riverton—Address Postmaster.
At Grasmere—Address John W. Fair.
At West Epping—Address Postmaster.
At Munsonville—Address Postmaster.
At Mason—Address J. W. Wharff.
At Thornton's Ferry—Address G. B. Griffin.
At Center Conway—Address W. E. Galmead Co.

Nevada—
At Fay—Address Postmaster.
At Ruth—Address Lockhart Bros.
At Currie—Address Postmaster.
At Pioneer—Address Postmaster.
At Lee—Address J. E. Williams.

New York—
At Clarksburg—Address Postmaster.
At Burnwood—Address Postmaster.
At Dykemans—Address A. Mullarkey.
At Aldrich—Address Peter Young.
At Bluff Point—Address Postmaster.
At Border City—Address F. B. Serven.
At Copiaque—Address J. C. Howell & Son.
At Speedsville—Address Paul Rockwell. This is described as a fine opening. Good shop and nice home can be gotten very reasonable,—good sober man wanted soon as possible.
At Deferiet—Address Postmaster.
At Cheviot—Address S. H. Miller.
At East Rodman—Address P. A. Moore. This is described as an "A No. 1 opening."
At Brookview—Address J. A. Ploth.
At Fultonham—Address Postmaster.
At Mottville—Address Postmaster.
At Chippewa Bay—Address W. M. Backus.
At Ganahgote—Address J. S. DuBois.
At Freedom—Address Jas. Griffith.
At Dexterville—Address S. Pooley. This opening is described as a very good one for the right kind of general smith.

New Jersey—
At Bartley—Address L. T. Hildebrant.
At Cookstown—Address J. H. Shinn.
At Avenel—Address Praser & Sons.
At Downer—Address Postmaster.
At Changewater—Address Edson Costner.
At Mizpah—Address Postmaster.
At Richland—Address Postmaster.
At Stanton—Address Benjamin Bloys.
At Marmora—Address Postmaster.
At Waterford Works—Address G. R. Pratt.
At Raven Rock—Address Postmaster.
At Fair Mount—Address Howard Sutton.
At Port Republic—Address D. B. Ashley.
At Grenlock—Address Postmaster.
At Franklinville—Address Postmaster.
At Carpentersville—Address Calvin Bros.
At Delair—Address S. Benson.
At Blawnnburg—Address Postmaster.
At Port Morris—Address Postmaster.

Oklahoma—
At Hughart—Address Postmaster.
At Overbrook—Address O. Merc. Co.
At Fairbanks—Address G. Powell & Co. Smith badly needed.
At Atlee—Address S. A. McDaniel.
At Crekola—Address J. W. Merrick. A good smith can do well here.

High Finance

Though his name was Solomon he was not overburdened with either gold or genius.

Like his much wiser and richer ancestor he was a Hebrew and he had many of the peculiarities of his race.

He never apologized for his ancestry.

He never bargained unless the advantage was on his side.

He never took any money out of his pocket unless he saw its value equaled—and then some.

And his persistence in asking about real estate and land values he explained by: "Vell, your money when it is in real estates can't go busted in a bank—and, what is more, all ready—you knows where it is."

Aside from this explanation you could get little out of him.

His point of view and his value of things were based on their equal in pounds of rags, paper and old iron.

He had learned—what a good many people credited with greater intelligence will never learn—to realize his limitations and that to go beyond them was foolishness.

He knew his business—silently allowed others to tell him what they thought he didn't know about his business—but he never attempted to say anything about that which he did not understand.

So you will realize that Sol—as he was generally known—was no fool and—"what's more"—he knew it.

Sol's business took him through many sections of the city—in fact through all sections where he and his rawboned horse and flat-wheeled wagon were not debarred. And wherever he went he seemed always to add to his smattering of real estate and land values.

It happened one day that Sol found the property with which to realize his ideal, i. e., to become a property owner. With the characteristics of his race he went over the proposition very thoroughly. Studying, considering, rejecting—figuring, planning, scheming—until, assured that he was not attempting the impossible and that his plans would carry, he started operations.

The object of his desires was a two-storied house for which the owner wanted $6,000; the first payment to be at least $600 and the balance to be divided between the bank, which already held a mortgage on the property, and the owner.

By methods for which his race is famous Sol persuaded the owner of the property to reduce the price to $5,500 and to accept $500 as a first payment.

He also learned that while the bank held a mortgage for $1,500 on the property it would be willing to loan an additional $800 on it.

Sol now borrowed $500 from a friend and made the first payment on the house. When he received the $800 from the bank he paid back the $500 and put the remaining $300 in his pocket until such changes and improvements as he had planned were to be paid for.

He then painted the house, repaired the fence, and made such interior changes as were necessary for his plans. And as he did considerable of the work himself he still had $150 left after paying all bills.

Sol and his family now occupy the basement of the house. He rents the two upper floors at a fair price and the attic floor he lets to a fellow countryman for a nominal sum. The house is paying for itself and Sol is looking for another "real estates investment."

BESIDE THE FORGE IN MR. BUGBEE'S ESTABLISHMENT—AN EXCELLENT PICTURE OF THE SMITH AT WORK

The Shop Kid

H. C. Barr

Y' 'member Johnnie Henderson,
Thet uster work fer me?
Nigh on to twenty years ago
I reckon it must be.

The durndest boy I ever seen;
Leastways I tho't so then;
He'd never stick t' nothin'
An' work like other men.

He'd allus fool away his time
Inventin' sum mashine,
An' workin' on a buggy, thet
Would run by gasolene.

An' when I'd put him on a job
O' helpin' in the shop
I'd have t' keep my eye on him
Er purty soon he'd stop.

He'd go t' makin' drawin's
O' wheels an' valves an' springs,
O' cams an' gears an' crank-shafts, an'
A thousan' other things.

An es thur war no autos then
Quite natch'rly we sed
Thet Johnnie must be crazy
Er foolish in his hed.

An' when it cum t' hammerin'
Er real work—so t' speak—
He warn't worth a quarter—
Ner fifteen cents a week.

So while I kind o' liked the boy
I had ter let him go—
I think he left the village
Within a day or so.

I hadn't seen er heard o' him
These twenty years er more
'Till yesterday—a tourin' car
Stopped out thar near the door.

A man jumps out, comes in the shop
An ses: "How do you do?
"I'm Mister John B. Henderson—
"I uster work for you"—

An' now that foolish shop kid's
The auto engineer
That builds the "Packless Peerson"—
"The car you cannot hear."

Which somehow kind o' makes me think
Y' cannot allus tell:—
Sumtimes the kids with figgerin' brains
Do really turn out well.

HEATS SPARKS WELDS

September-r-r and oysters.

No, a wagon smith is not necessarily a wagging smith.

To be a winner is easy compared to being a loser and losing like a man.

From the number there are at the bottom there must be plenty of room there, also.

Make a noise in your community. Any kind of noise will do, except snoring.

Brooding over troubles hatches out more, it doesn't diminish their size.

Be the first to "give-in" when a customer wants to argue too long over a matter.

Wouldn't we be good if possessed of all the virtues we demand in others?

Yes, there is considerable difference between pump jacks and Jack's pumps.

The blacksmith is entitled to a square deal, but he's got to fight for it just the same.

According to the poet, brooks babble and trees leave; but when a man babbles, we leave.

Hans Dillburger says: "Such a goot name may pe felled py von stroke; pud a oak is not puilt in von day."

And when it comes to voting, you'll be able to cast your ballot more intelligently if you talk politics less and business more.

Experience is a fine thing, but wouldn't its value increase wonderfully if we could dispose of it at less than cost?

Have you noticed the extreme low rate of accidents per capita in aviation? And yet they call it dangerous.

And while we're listening to all the talk about bumper crops, just consider for a minute how many farm implements would NOT be sold if it weren't for the weed crop!

Ever hear the "dead-beats" shouting about the high cost of living? And yet they help boost the price of everything they don't pay for.

The man you intend voting for may be a very fine chap, but what does he stand for? Your congressman may be a good fellow, but how does he vote?

We're not a solicitor, director, nor the president of an insurance company, but suppose your shop burned to the ground tonight! Is it insured?

Of course you've taken that vacation and are feeling fit and fine for the steady grind of the busy fall! Did the Missus and kiddies go, too?

When a man like Tom Tardy says he's sorry he ever LEARNED the trade you can make up your mind that he never "learned" it and never will.

Those signs off the shop? We mean the patent medicine, tobacco and other advertising—better put up neat signs of your own. They will look better and put more real money in your pocket.

Are you a member of the B. L.? Don't let anyone knock your trade. Sometimes the biggest knockers are those earning their living in the trade. Again we ask, are you a member of the Booster's League?

Information and perspiration will help the smith make more money than all the inspiration he can put into a bottomless pit. We'll supply the information if you furnish the perspiration.

Occasional inquiry regarding a job done for a customer tends to impress him favorably and to remind him of you and your business. But if he's not satisfied be ready and willing to make good. It will help a heap toward more of his traed.

A man may read all the books published on the subject of horseshoeing and yet not cure a case of foot trouble in just the way the book says. The shoer must know the correct principles of shoeing and then use common sense in correcting foot troubles.

There's been a big change in the craft in the past ten years; what do you think the shop of ten years from now will look like? Big changes will take place—some are taking place now. What do YOU think will be the result?

We know that you are one of the wide-awake business men of your town and vicinity—but let your town folks know it. Get into the habit of leading the procession of progress. It will pay you in a great many ways.

How long can a business of any kind succeed and grow if its owner does not look into the future? The ability to look into the future, the striving to do for to-morrow and not merely for today, has built the big businesses and will build more. Try it.

The chap who starts with little or nothing is simply compelled to make a profit. That's why you hear of so many successes starting from nothing. Given two men—one with a fair knowledge of business and little or no capital, and one with plenty of capital and cost ignorance, which one would you bank on?

Easier by far is it to change one's mental attitude toward conditions than to change conditions themselves. Take the automobile invasion of the horse field, for example; nothing we can do singly or collectively will stop the increasing use and popularity of the auto. Yet some smiths will argue against the increasing use of motor vehicles in face of the fact that they feel its effect in their business. Many a man, before now, has lost good business by stubbornly opposing conditions he could not control, when by a little self-adaptation he might have made them advantageous to him. Think this over seriously, Mr. Reader; turn it over in your mind several times. There's a moral.

Our Honor Roll

Class of 1922 Growing

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NAME	Subscription Paid to
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W. R. Turner, Man	Oct., 1923
T. Bradley, N. S. Wales	Mar., 1923
W. Lawson, N. Z	Nov., 1922
J. Tomkiewiez, Que	Sept., 1922
A. Pfeiffer, Ohio	Aug., 1922
Louisa Carriage Wks., Va	May, 1922
S. Smith, Tex	Apr., 1922
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E. A. Dillon, Nev	Mar., 1922
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O. M. Johnson, Minn	Oct., 1921
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W. K. Kline, Kan	May, 1921
R. S. Crisler, Ky	Jan., 1920
I. M. Townsend, Cal	Apr., 1919
C. Williams, W. Aus	Mar., 1919
T. P. Considine, Mass	Dec., 1918
Richard Brenner, Tex	Feb., 1918
W. F. Hill, N. C	Feb., 1918
P. J. Dally, W. Aus	Jan., 1918
J. Morrow, Pa	Jan., 1918
Mess Bros., Vict	Dec., 1917
B. A. Steinke, Ohio	Nov., 1917
J. N. Bathgate, N. Dak	Nov., 1917
W. C. Roney, Pa	Oct., 1917
J. N. Miles, Ky	Oct., 1917
H. Ferrel, Ill	Aug., 1917
J. McMeeken, N. Z	Aug., 1917
F. H. Gierke, S. Aus	Aug., 1917
V J. Hubbard, N. Y	July, 1917
W. R. Gelling, S. Africa	June, 1917
J. H. Bakeberg, S. Africa	June, 1917
A. R. Hallenbeck, N. Y	June, 1917
F. C. Bock, Neb	June, 1917
Yost & Halvorson, Minn	May, 1917
W. McCoy, Kan	May, 1917
A. Guettler, Tex	May, 1917
C. F. J. Lorenz, N. Y	May, 1917
A. Datwyler, Ohio	May, 1917
E. Thibaudeau, Wis	Apr., 1917
W. Pickering, S. Africa	Apr., 1917
Ed. Burrows, England	Apr., 1917
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J. C. Woods, W. Aus	Mar., 1917
C. Boulton, N. S. Wales	Mar., 1917
C. A. Hawkins, Ore	Mar., 1917
A. L. Monycott, W. Va	Mar., 1917
J. Peterson, Ia	Mar., 1917
J. Anderson, Tas	Mar., 1917
A. J. Neill, Vt	Mar., 1917

NAME	Subscription Paid to
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Lewis Chase, N. Y	Mar., 1917
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August Millet, Ill	Feb., 1917
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L. V. Senn, Neb	Jan., 1917
S. H. Austin, N. Y	Jan., 1917
H. Kahl, Ia	Jan., 1917
J. H. Bergen, Kan	Jan., 1917
F. G. A. Williams, S. Aus	Jan., 1917
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A. H. Gooding, S. Aus	Dec., 1916
Leonard Smith, N. J	Dec., 1916
C. F. Shaw, Man	Dec., 1916
W. Elward, Pa	Dec., 1916
W. W. Egly, Pa	Dec., 1916
Jos. Boyer, Mich	Dec., 1916
J. Williams, N. S. Wales	Dec., 1916
J. H. W. Schneider, Cal	Dec., 1916
W. Sauer, Minn	Dec., 1916
F. F. Darling, Cal	Dec., 1916
Chas. Newland, Cal	Dec., 1916
J. T. Brahm, Ia	Dec., 1916
P. H. St. Louis, Wis	Dec., 1916
A. E. Nickols, Okla	Dec., 1916
C. J. Hall, Wash	Dec., 1916
Bob Fricke, Ala	Dec., 1916
Joeris Bros., Tex	Dec., 1916
R. Clemens, Conn	Dec., 1916
Scheffley & Schmitt, Pa	Dec., 1916
A. Brause, Ohio	Dec., 1916

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F. W. Howell, Ill	Dec., 1916
Tom Nolan, S. Aus	Nov., 1916
H. J. French, N. Z	Nov., 1916
F. N. Browning & Son, Ky	Nov., 1916
J. Macuab, Scotland	Nov., 1916
P. Gessen, Ill	Nov., 1916
J. W. Gribble, S. Aus	Nov., 1916
W. G. Sim, N. Z	Nov., 1916
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G. Lindborg, Ind	Nov., 1916
Pittman Stell, N. C	Nov., 1916
J. S. Finkenbiner, Ind	Nov., 1916
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T. J. Haskins, N. S. W	Oct., 1916
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Clark Olds & Co., Neb	Oct., 1916
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C. E. Durham, Kan	Oct., 1916
M. Ringo, S. Africa	Oct., 1916
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J. K. Glinicki, Mich	Sept., 1916
Oscar Buhner, Md	Sept., 1916
A. J. Hammond, Cal	Sept., 1916
Robert Murray, Cal	Sept., 1916
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J. S. Haskell, Col	Sept., 1916
R. Sommer, Aus	Sept., 1916
J. A. Sequin, Can	Aug., 1916
James Clarke, Jr., Aus	Aug., 1916
Dispatch Fdy. Ltd., N. Z	Aug., 1916
J. W. Fowler, N. Z	July, 1916
A. C. Lodwig, Cal	July, 1916
A. A. Bahlke, Mich	July, 1916
J. K. Hansen, Aus	July, 1916
J. B. Barker, Ill	July, 1916
H. M. Larsen, Wis	July, 1916
Geo. P. MacIntyre, Me	July, 1916
Jas. A. Buchner, Mich	July, 1916
H. M. Fingar, N. Y	July, 1916
L. H. Strange, Vict	July, 1916
P. O'Donnell, Vict	July, 1916
R. J. Hancock, N. Z	July, 1916
F. G. Wilson, Colo	July, 1916
J. Chalmers, S. Africa	June, 1916
G. R. Harrison, Aus	June, 1916
J. Waycich, S. Africa	June, 1916
W. Voight, S. Africa	June, 1916
Martin Jensen, Wis	June, 1916
Chester Humbert, Wis	June, 1916
Lincoln Underhill, Cal	June, 1916
M. Broton, N. Dak	June, 1916
Hans Eriksen, Ill	June, 1916
C. Morrell, N. Brunswick	June, 1916
J. O. Conrad, Kan	June, 1916
Adam Schmitt, Mich	June, 1916
I. H. Lunder, N. Dakota	May, 1916
James Sinclair, W. Aus	May, 1916
H. Baker, Aus	May, 1916
E. Q. Krehbiel, Kan	May, 1916
C. H. Cairns, N. Y	May, 1916
P. V. Johnson, Ohio	May, 1916
F. E. Smith, Vt	May, 1916
C. A. Stebbins, Kan	May, 1916
Sanford Baker, Mo	May, 1916
E. B. Anderberg, Ill	May, 1916
Kelliher Bros., W. Aus	Apr., 1916
P. A. Peterson, Ia	Apr., 1916
G. F. Bowers, Okla	Apr., 1916
D. E. McDonald, Fla	Apr., 1916
James Baxter, S. Africa	Apr., 1916
E. P. Dignan, S. Aus	Apr., 1916
W. H. Winget, Vt.	Apr., 1916
C. Schmid, Neb	Mar., 1916
A. Rockenschup & Son, La	Mar., 1916
C. H. Alexander, N. Y	Mar., 1916
A. M. Harebo, Wis	Mar., 1916
George Howard, Kan	Mar., 1916
G. N. Follmar, Neb	Mar., 1916
W. Willoughby, Mich	Mar., 1916
H. Hoffmeyer, N. J	Mar., 1916
Frank L. Locke, N. Y	Mar., 1916
Frank L. Evarts, Conn	Mar., 1916
C. R. Winget, Vt.	Mar., 1916
H. & J. Chisholm, N. Z	Mar., 1916
C. F. Molkenten, Aus	Mar., 1916
H. D. Phillips, S. Aus.	Mar., 1916
J. B. Fry, Wash	Mar., 1916
L. A. Downing, Cal	Mar., 1916
A. A. Schreiber, Tex	Feb., 1916
J. T. Dillard, Tex	Feb., 1916
F. J. Flessel, N. Y	Feb., 1916
E. P. Jones, Kan	Feb., 1916
E. J. Bishop, N. Y	Feb., 1916
J. N. Tyler, Ohio	Feb., 1916
Chas. H. Kern, Ill	Jan., 1916
J. H. Ecroyd, Cal	Jan., 1916
Thomas Horne, Ariz	Jan., 1916
Charles Tucker, Mich	Jan., 1916
M. Klitgord, N. Y	Jan., 1916
O. Stenning, S. Dak	Jan., 1916
Iver Johnson Arms and Cycle Works, Mass	Jan., 1916
Feldmeyer & Schaake, Kan	Jan., 1916
Chas. Winter, Cal	Dec., 1915

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Geo. Sykes, Aus	Dec., 1915
W. Patrick, N. Y	Dec., 1915
Jas. A. Sharp, Mass	Dec., 1915
J. Krahulec, Ill	Dec., 1915
P. E. Dahlfurst, Cal	Dec., 1915
Wm. Bisher, Ohio	Dec., 1915
C. A. Jerner, Neb	Dec., 1915
G. S. Fisher, Neb	Dec., 1915
Printers Supply Company, Neb	Dec., 1915
M. Kennedy, Tasmania	Dec., 1915
Williams & Turner, W. Va	Dec., 1915
C. J. Ash, Kan	Dec., 1915
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C. W. Ames, Mass	Dec., 1915
C. L. Sorensen, Neb	Dec., 1915
E. Williams, N. Y	Dec., 1915
W. Urquhart, N. Z	Dec., 1915
W. Rupe, Kan	Dec., 1915
L. S. Kocher, Ia	Dec., 1915
P. W. Frazer, N. Z	Dec., 1915
J. F. Shimanek, Md	Dec., 1915
J. MacClure & Son, N. Z.	Dec., 1915
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J. P. Carrick, Ind	Nov., 1915
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L. P. Mortensen, Mich	Nov., 1915
R. L. Whitfield, N. S. W	Nov., 1915
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N. W. Hammond, Col	Oct., 1915
P. G. Dairdson, N. Dak	Oct., 1915
C. N. Mills, Cal	Oct., 1915
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C. C. Perry, Aus	Oct., 1915
Sidney Stevens Imp. Co., U.	Oct., 1915
W. H. Findlay, N. Z	Oct., 1915
R. F. Watson, Cal	Oct., 1915
H. R. Stone, Conn	Oct., 1915
F. Teuber, Ga	Oct., 1915
J. J. Doran, Va	Sept., 1915
W. H. Mitchell, Mass	Sept., 1915
S. W. Winch, Vt	Sept., 1915
Ed. Hammill, Cal	Sept., 1915
R. D. Simkins, Pa	Sept., 1915
T. J. Reynolds, Pa	Sept., 1915
Wm. Bates, Tex	Sept., 1915
J. Knight, England	Sept., 1915
L. F. Kuhn, Mexico	Sept., 1915
A. W. Wood, W. Va	Sept., 1915
Hugh L. Lynn, Ky	Sept., 1915
H. P. Sorenson, Wis	Aug., 1915
Leo Bruns, Ia	Aug., 1915
M. A. Walsh, Colo	Aug., 1915
Leslie Cooper, Ohio	Aug., 1915
Advance Blacksmith Co., Mo	Aug., 1915
A. Chargois, Queens'd, Aus.	Aug., 1915
A. M. Byfield, W. Aus	Aug., 1915
C. E. Allen, Neb	Aug., 1915
M. J. Roder, Mont	Aug., 1915
J. E. Lyon, Tex	Aug., 1915
F. W. Krenz, Cal	Aug., 1915
J. W. Storment, Ill	Aug., 1915
Jos. P. Rotolinski, Mass	Aug., 1915
C. H. Pearce, Aus	July, 1915
John Hehor, N. Y	July, 1915
T. O. Chittenden, N. Z	July, 1915
The Goldfields Diamond Drilling Co., Aus	July, 1915
J. A. Lawton & Sons, S. Aus.	July, 1915
W. C. Jones, N. C	July, 1915
J. Picotte, Yukon Ter	July, 1915
George M. Ferree, Ut	July, 1915
T. S. Finnigan, Vic., Aus	July, 1915
R L. Parker, Ohio	July, 1915
J. Manly, Aus	July, 1915
G. Sundberg, Wash	June, 1915
I. F. & F. A. Stewart, Ohio	June, 1915
C. F. Seiffert, Texas	June, 1915
S. A. Stilles, Ohio	June, 1915
E. L. Herring, Fla	June, 1915
G. R. Twedell, Miss	June, 1915
H. P. Houghton, Ill	June, 1915
J. W. Ivie, Ut	June, 1915
A. B. Jardine & Co., Ont.	June, 1915
L. Martin, Texas	June, 1915
John Payne, Col	June, 1915
M. J. Coughlin, Ill	June, 1915
J. K. Crawford, N. Z	June, 1915
F. W. Schlein, Ga	June, 1915
B. L. Marsh, N. Y	May, 1915
H. Deifenbaker, Ill	May, 1915
F. J. Wurtz, Neb	May, 1915
E. C. Cullers, Va	May, 1915
W. Leihsing, Okla	May, 1915
J. Smith, N. Y	May, 1915
Harry Ham, Kans	May, 1915
J. A. Miller, S. Dak	May, 1915
B A. Parker, Ga	May, 1915
J. C. Klein, Miss	May, 1915
N. B. Demarret, N. J	May, 1915
E. E. Mercer, Kan	May, 1915
Schintgen & Maier, Minn	May, 1915
A. E. Spangberg, Ore	May, 1915
W. S. Helmecke, Tex	May, 1915
F. F. Putnam, Pa	May, 1915
Otto Siebler, Tex	May, 1915
W. A. Matson, Ut	May, 1915

Ten Questions for the Month

The questions this month are on the subject of gas engines. In these days of gas engine power in the smith shop, and gas engine power in the automobile, commercial vehicle and farm tractor, the smith cannot know too much about the internal combustion engine. The questions apply to the gas engine or motor, whether found in the smith shop, the automobile or on the farm.

1. What is the principle upon which the internal combustion motor operates?

2. What is meant by "two-cycle engine" and "four-cycle engine?"

3. Describe the operations or movements of the four-cycle engine.

4. How are these operations made continuous, i. e., why does the engine continue from one operation to the next without stopping?

5. What means are commonly used to ignite the compressed charge of fuel?

6. How are the crankshaft and flywheel prevented from running in the wrong direction?

7. What is an automatic valve?

8. What is a mechanically operated valve?

9. Why are piston rings employed in the gas engine?

10. Why is it necessary to cool the gas engine by mechanical means?

Answers to Questions in August Issue

1. Harveyized armor plate is a soft steel which has been rolled down and one face of which has been impregnated with carbon by heating it for a number of days at a temperature of about 2200° Fahrenheit while in contact with a carbonaceous material. The carburized face is then hardened by spraying with cold water.

2. Carbon steel is any steel which owes its chief properties to the various percentages of carbon which it contains. It is distinct from alloy steel in that the latter owes its chief properties to elements other than carbon.

3. Tungsten steel is an alloy steel containing from 5 to 10% of tungsten and up to 2% of carbon.

Vanadium steel is an alloy steel containing from 0.15 to 0.25% of vanadium. The vanadium raises both the tensile strength and also the elastic limit of the metal. This steel is used for springs, automobile parts and for other items such as are subject to sustained vibration.

4. Charcoal iron is pig iron smelted with charcoal, or wrought iron made by the charcoal hearth process.

5. High-speed steel is a special alloy steel used for cutting tools. It gets its name from the fact that a tool made from this steel will retain its cutting edge even when extremely high speeds are employed.

6. An ingot is a casting into which metal is formed for subsequent rolling or forging. Ingots are usually rectangular in section.

7. Expanded metal is formed of sheets of metal in which a series of short, disconnected transverse cuts have been made and the sheets then pulled or extended, producing the effect of a perforated sheet or grille.

8. Heat treatment is the application of heat which effects certain changes in the structure and condition of the metal. It may be the application of a high heat with consequent quick or slow cooling or the application of a low heat and consequent cool. Or it may be a combination of repeated heatings to certain degrees for certain periods of time, in order to produce a certain condition in the metal.

9. Physic and physicking are terms used in connection with the puddling process. It means the addition of materials to assist in the removal of impurities from the metal.

10. Fireclay is a clay composed largely of silica and small amounts of lime, iron or alkalies and is not easily fusible.

How to Buy a Gas Engine

H. R. V.

First, buy your engine through a reputable manufacturer or dealer. Such a man will take a personal interest in having your engine run well.

It does not pay to buy your engines from a comparatively unknown concern. Such people as a rule make their customers pay for their experiments. Repair parts cost high and take a long time to get, and the unreliable maker has no personal interest in whether or not you succeed in using the engine properly.

Gasoline as fuel gives the best service for a small engine, but kerosene and other heavy oils are rapidly coming into favor for the larger sizes. An experienced engine salesman will tell you which is the best fuel for your purpose and which will cost you the least.

If you want to drive machinery that takes 10 H. P., get a 12 or 15 H. P. engine. Don't load your engine up to the limit and expect it to do good work.

Use good fuel and the very best oil obtainable. It really pays to use a good oil even if it costs twice as much as the cheaper kind. In the first place it will go further and, secondly, it keeps the engine from wearing out.

After getting the engine, read the instruction book carefully before trying to operate. Don't let someone who has another make of engine tell you how to start and run yours, as instructions for different kinds of engines differ.

Don't let so called experts monkey with your engine. The troubles with engines are usually dirty igniter points, stopped up gasoline or water pipes, lack of oil or the valves are out of adjustment. Any of these troubles are easily remedied by anyone with common sense, without having to take the engine apart. An imitation expert can always be told by pretending to know exactly what is the matter with the gas engine almost instantly and by the fact that he will immediately want to tear the entire engine apart.

On engines having cheap sparkers, such as many of the older engines are equipped with, ignition troubles were plentiful and these require an expert for their location and remedy, but with the more modern equipped engines these troubles are eliminated.

If the engine is to be used in one place, bolt it down to a good foundation. Don't bolt it to a lot of loose timbers set on a dirt floor.

Get a good storage tank for the liquid fuel and put it preferably

under ground. Read instructions sent with the engine and see that the tank isn't buried so deep that the engine fuel pump won't draw.

Forging Eye Bands

WILL DAVIES

Brother Peterson remarked that it takes a good man to make a five-eyed hoop by stumping on the eyes, and it certainly does take a good man to make them flawless. I have made a great many that way myself, but have learned a better and safer method, as follows:

Supposing we have to make a four-eyed hoop, 7 inches in diameter, band to be 3 by ⅝ inches, and eyes 2½ by 1 inch, with a ⅞-inch hole in each. First take a piece of flat iron, 3 by ⅝ by 44 inches long. Then measure enough iron to make half the band between the eyes, adding half the eye and ½ inch to weld, which takes about 8½ inches. Mark this with center punch, and heat. Cut two thirds through and bend upon itself. Weld up enough of the doubled end to form an eye, which is 2½ inches. After this, spread the ends in a vise neat and flat as shown at A. As you all know, no matter how good a weld of this kind is made it will always open up to a certain extent. The idea now is to fill up this crack or throat. The first thing to do is to make a tool for this. I made one out of a lump of pig iron about 4 inches long and 3½ inches square. Punch a hole big enough to take the eye, namely, 2½ inches by 1 inch, taking care to round off the top edges so as not to cut the work. The finished tool is shown at B.

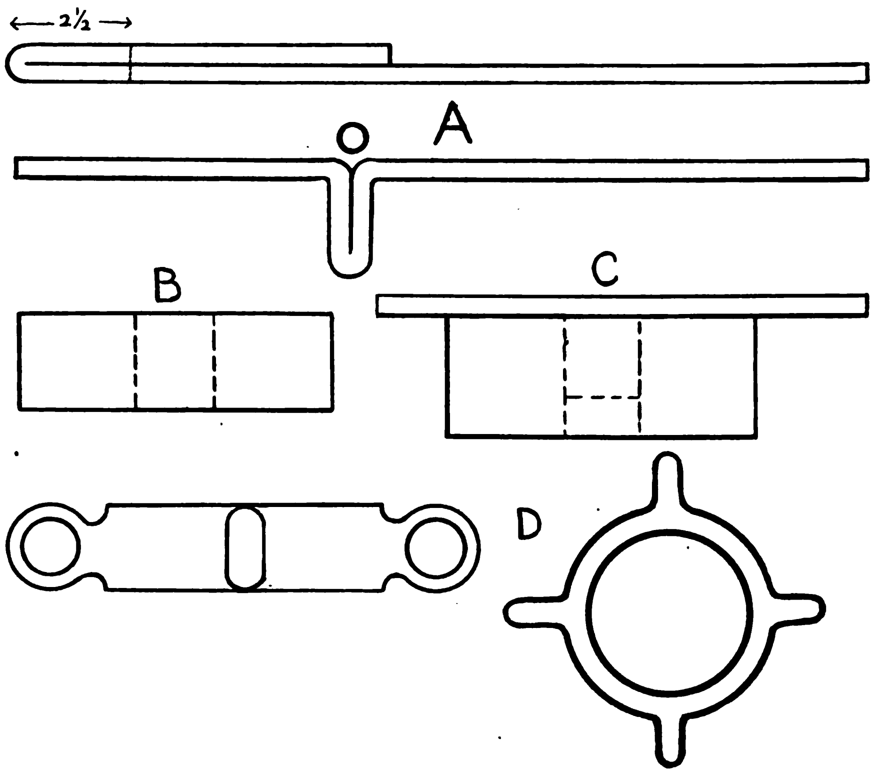
Next take a piece of 1-inch round iron and flatten a little V-shape if desired. Cut nearly through at 3 inches from end and leave on so that it can be handled. Then take a welding heat on both pieces (two fires are best), taking a good molten heat on the round piece. When hot, place band in tool quickly and drop piece in throat, and let helper come down light and quick until everything is filled up nice and level, as shown at C. Then trim the sides with a hot chisel. This must all be done in one heat, as it is nearly impossible to get a second without burning one side or the other of the band.

When this is finished, leave this eye and go on with the next, allowing full distance between the eyes, until all four are made. Then turn the band and weld it up, punch holes, round up and fuller to shape. Next true up on a mandril or on a big pipe, or the horn of anvil will do. The finished band is shown at D. Three, four or five eyes can be put on in this way, and is known to stand a severe test. This band is used for ships, derricks or booms, for attaching pulleys for lifting weights out of the hold, etc.

I am running my own shop here in Canada, having left England eighteen months ago. Have been fourteen years at the good old trade, but still have a lot to learn. The prices here are rather low. Some of them are as follows:

Horseshoes, new, per set	$1.00
Bar or special shoes, each	.40
Re-set, four shoes	.50
Neverslips, per set	2.00
Neverslips, reset	1.00
Tires, buggy, per set	2.00
Tires, wagon, per set	2.00

I don't do much wood work. My tools are new, Canedy-Otto make. Power is not heard of here as yet, with the exception of water power.



THIS INSURES A BETTER AND SAFER JOB THAN BY STUMPING ON THE EYES

Some Sins of Omission Under Partnership Law and How to Avoid Them

There comes a request for advice from Colorado, which affords an opportunity to say something more on the law of partnership, and to emphasize again one phase of partnership law which should be emphasized over and over again, viz., that a man who takes a partner, necessarily and inevitably puts himself in the other man's power to a very considerable extent. If business men could only realize this there would be fewer partnerships and fewer losses through the partnership relation.

Also something as to how difficulties arising out of this fact can be guarded against:—

Frederick, Col., May 11, 1912.

Elton J. Buckley, Esq.

Dear Sir:—Would you be kind enough to give me some information regarding the following:—

Two years ago I was in a manufacturing business, and I decided to take in a partner. I soon found one who had the required amount of cash, and he also claimed and in fact made a statement to Bradstreet's agency that he also owned a farm worth $4,000 which was clear. He seemed to be a clean-cut fellow, and shortly asked me for favors. I signed notes and guaranteed some of his bills. One night while I was

out of the city on a week's trip he and his family left for parts unknown, and as soon as I found that he had run away I went to investigating and found he had been collecting bills for weeks and had taken every cent with him, and of course it was up to me to pay the bills. I soon found out that he did not own the farm, but he had lived on it for five years, but his brother claimed to own it. I don't know just where he is, but I have an idea he is in Chicago. I think this brother, who lives on the farm in South Dakota, knows where he is. He also had a father in the laundry business in Chicago who was reported to be in fair circumstances. Will you be kind enough to give me some advice as to how to go after this party? Thanking you in advance for the favor, I am,

Yours very truly,
ED. KLEIN.

The best way to go after a dishonest partner is not to go in with him in the beginning. This case is a good type of the carelessness with which men assume a relation which in closeness is only next to that of husband and wife. This correspondent doesn't say what bearing the ownership of the $4,000 farm had upon the partnership contract—whether it was supposed to be a part of the capital the new partner was to invest or not. In any event, whatever bearing it had, and it must have had some, or it wouldn't have figured in the deal, this correspondent was exceedingly negligent in not looking it up. It is easy to tell whether a man tells the truth when he says "I own a piece of property"—look at the records where the title is recorded. To take him in as a partner either wholly or partly on the strength of a statement as to his financial resources which you do not even investigate, is criminally careless.

I was interested in another case recently of the same sort. An apparently prosperous livery stable keeper went out to get a partner "because he wanted a rest." He found a man who had retired from the milk business—for the same reason—and who had a little money. The milkman took the livery stableman's word as to what his assets and liabilities were, and put every dollar he owned into the business. Shortly afterward they found it necessary to borrow money from a bank, and both partners went to the cashier, and the original owner of the livery business repeated to him the statements as to assets and liabilities which he had made to his partner before he became a partner. The latter, believing them, reiterated them to the bank cashier and thus made them his own.

The statements turned out to be rank falsehoods, and the ex-milk dealer, besides being duped by them into investing in an enterprise which had actually been gutted from top to bottom, was arrested, indicted and tried for false pretence. He was not convicted, but only because he was shown to be merely a dupe.

All this experience could have been avoided had the livery stableman's statements been investigated in the beginning, as they could easily have been.

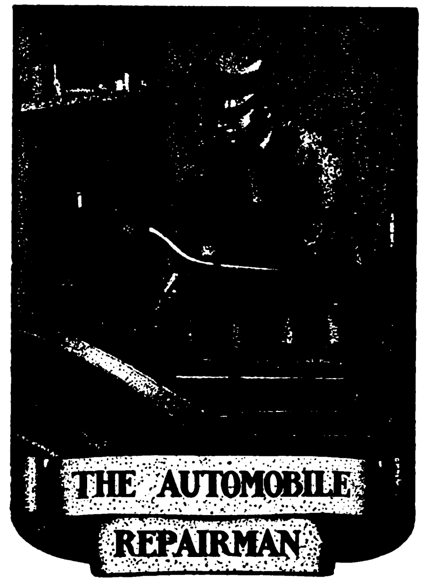
It can be set down as a general proposition that the statements of a man who is either proposing to take you in as partner in his business, or to go in with you in yours, should never be accepted without the most thorough investigation.

How can this sort of thing be avoided? By a plan which some partners would perhaps resent having proposed to them, but which is nevertheless the only real protection to all parties which I know. I mean the giving by each partner to the other or others of a bond against just such frauds and dishonesties as this Colorado correspondent speaks about.

Of course, one member of a partnership cannot steal money from his fellow member any more than anyone else can. I advise this correspondent that he can follow his partner and arrest him probably on two grounds, certainly on one. First, false pretence, in that—I assume—he obtained some advantage from his false statement as to ownership of the farm. Second, for collecting moneys due the firm and fraudulently converting it to his own use.

Now suppose at the beginning of this partnership each partner had given to the other a bond in, say, $5,000, or in such sum as the case might have required, conditioned against embezzling the firm's moneys, or misappropriating the firm's assets, or doing any other illegal thing which might result in loss to the remaining partner or partners. If my Colorado friend had had such a bond he would now simply need to count up his losses and collect them under the bond. Naturally he would have had to give his partner a similar bond, but there is no risk to an honest man under such a plan.

(Copyright, 1912, by Elton J. Buckley)



Some Emergency Repairs On the Automobile

C. J. WRIGHT

Since taking on automobile work at our shop we have naturally come to divide the work into two classes: The repair for the touring party, which repair is usually of the temporary kind, and the repair for the resident motor car owner, which work requires more skill and must be done as neatly and as strongly as possible. I will attempt to explain a few of the temporary or emergency repairs that we have been required to do during our automobile experience.

Rod breakages have perhaps been the most frequent of the repairs we are called upon to make. These we usually repair by fitting a sleeve over the broken ends and then drilling and riveting, as shown at A.

However, there are times when, by reason of the rod working in close proximity to other parts or when it is broken at a point where it runs through another part which fits it too close to allow for a repair of this nature, it is necessary to drill carefully into the broken ends, to insert a pin and to rivet the pin in place as at B. Sometimes it is necessary to thread the holes and, of course, the pin and thus screw the ends together.

In all repairs, and especially those of rods, whether brake rods, valve rods, steering column or any of the other rods on a car, it is imperative that you neither lengthen nor shorten the rod in repairing it.

A close second in the number of breaks and repairs are those of springs. And there are perhaps as many ways of repairing broken springs as there are styles of spring breaks. A spring may break in almost any number of leaves and almost anywhere from one end to the other. Several methods of repairing center breaks are shown at C. The repair bar, X, is of steel and is held in place by the two steel spring clips. The knobs on the ends of the bar keep the clips from slipping off it. The steel bar should be nearly as wide as the spring; or if made narrow two bars can be used.

The material used at Y was a piece of oak. We had none of the steel bars in stock when this car drove up and as the driver could not wait we quickly put in the oak piece and used several windings of wire to hold it in place.

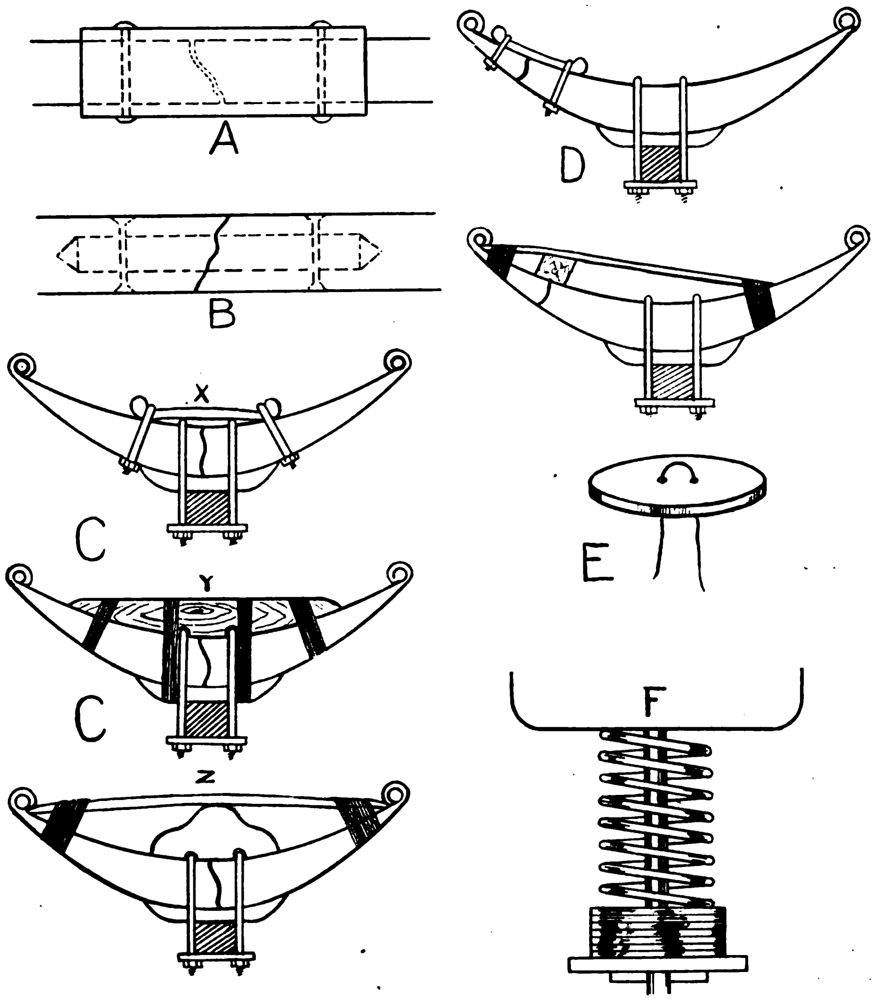
Another repair is shown at Z. Here we used the rubber bumper to help in making the spring temporarily serviceable. The supporting bar was a heavy spring leaf. This was held in place by windings of stout wire.

Several repairs to springs that have broken near the end are shown at D. In the first example a spring leaf was utilized. A wood block placed over the fracture and the spring leaf placed on it as a lever enabled the motorist to proceed on his way.

The second case, showing an end break, illustrates how the steel bar used at C, Fig. X, may also be utilized for a fracture near the end of the spring.

A little kink that may help you out some time just as it helped us to get into the good graces of a number of autoists is illustrated at E. A car owner for whom we were doing a job complained when we were testing the machine that the bonnet was noisy and that he had never been able to fix it so it wouldn't rattle. We quieted the noisy bonnet by taking a number of rubber disks and running a wire through them as shown at E. We then drilled a number of very small holes along the edge of the raditor upon which the bonnet rests, drilling the holes in pairs. We then wired the rubber disks onto the edge of the radiator. The bonnet then rested on the rubber instead of on the metal of the radiator edge.

A broken valve spring may again be put into working condition by building up the shortage with common washers, as shown at F.



SOME EMERGENCY REPAIRS FOR THE AUTOMOBILE

A Comparison of the European and American Metal Industries

W. H. Dooley

As an American goes about among the manufacturing establishments on the continent of Europe, he is greatly surprised at the lack of use of machinery in the generation and transmission of power. Then again there is a lack of all sorts of devices in order to save labor; lack of method in handling large quantities of materials and finally the lack of division of labor in carrying out the work of the shop.

The state of mind of the average engineer or manufacturer might well be described as that of a man well on in years who has amassed a fine fortune and now takes things easily and loves to talk over the doings of his plant. He seems to find it difficult to reconcile the old world methods with advanced ideas. In the United States, on the other hand, there is a tendency among the engineering class to abandon slow hand processes. This tendency has been as strong as the tendency in Europe has been to adhere to them. The former characteristic is distinctly American.

This advantage that America has over Europe has been contributed by the comparative freedom from inherited and over conservative ideas that have been handed down from tradition in Europe. America has started upon its industrial development unfettered by the old order of things and with a tendency on

the part of the people to seek the best and quickest way to accomplish every object.

Few realize the great strides the European Metal Industries have taken within the last few years. This is particularly true in regard to Germany, where the products of the Sachsiche Maschinin Fabrik and the Chemnitzer Werkung Maschinin (machine tools) Fabrik are known all over the world, and will be better known in the future. For Germany realizes that her metal industries must depend greatly on foreign trade and is making every effort to meet the needs of the trade in the different lines. The famous workshops of Manchester, Oldham, Keighley and other machinery centers of England are feeling the effects of the Germans in their own cities.

The rise of some of the German shops reads like a romance. The beginning of machine building in Chemnitz dates from 1826 and the pioneer was a man named Haubold. He built the first steam engine in 1829. Among the men in his employ was a mechanic named Richard Hartmann. He soon proved to be a genius in the mechanical line and started in business for himself. That was in 1837. In 1841 he employed seventy-six men and delivered the same year his first steam engine. Later he built looms. He never went back, but prospered in making one branch of engineering after another, till today he manufactures every conceivable machine for mining, milling, textile work, etc., besides machine tools.

The question may be asked—what bearing has this on America? We realize that the American manufacturer has better organization than his European competitor. But cannot the European manufacturer copy our organization, our systems, our methods? Especially as the American manufacturer is comparatively liberal in allowing visitors to view his plants and workshops.

The most striking feature of German engineering and machine shops is their clean, orderly and well kept condition. This seems to be universal and applies to the smallest jobbing shops. The German machine shops and particularly their foundries are a revelation to any American. The foundries are as clean and well kept and almost as light as any other shop. The remarkable order maintained is systematic and in a large measure intended to promote the prevention of accidents. In the accident prevention rules of the Rhine Westphalian Engineering and Small Iron Industries Association I find it laid down in the first paragraph that:—

"The gangway in all the workrooms must be broad enough to exclude as far as possible injury to persons using them, by machinery or transmission parts in motion. They must be kept in good condition and must not be blocked by the heaping of material or the transportation of articles."

Compare this rule with what one sees in our own American machine shops and foundries—half-manufactured or manufactured articles lying promiscuously about, blocking the passageways and affording no room to move about. The entire freedom from such disorderliness in German foundries undoubtedly conduces to efficiency as well as to safety, and is secured chiefly through the habits of order inculcated into all alike—workmen, managers and owners.

The German foundries and machine shops attempt to do a great many lines of work. This is due to the fact that the machine shops and engineering plants attached to the foundries are turning out more varied kinds of work than the American foundries and engineering works. The result is that the American manufacturer, who specializes, can turn out castings cheaper than the German manufacturer. There is another advantage which the American has over the German, and that is shop efficiency. German manufacturers are not economical in manual labor. They have not the thousand and one devices we have for doing away with manual labor.

The workmen of German foundries

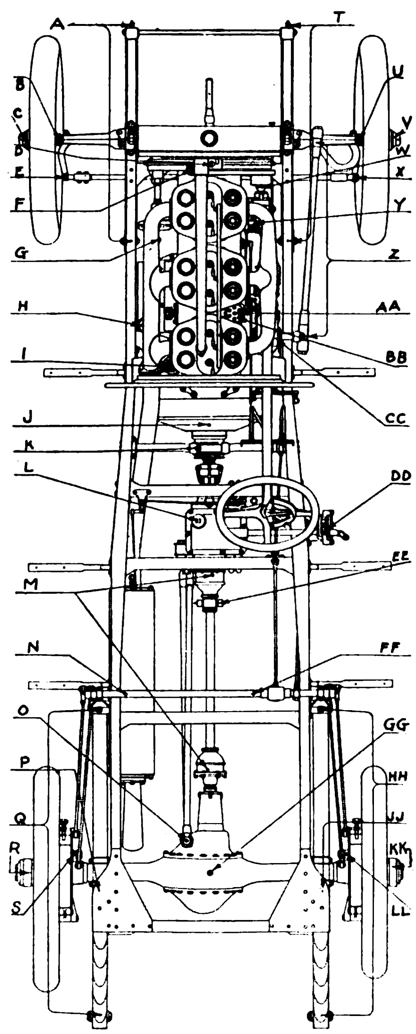


CHART OF AUTOMOBILE CHASSIS—PARTS TO BE LUBRICATED, PROPER LUBRICANT TO USE AND FREQUENCY OF APPLICATION

A-Q-T-HH—Spring: Machine Oil—few drops weekly.
B-U—Steering Knuckle: Light Grease—one turn of cup daily.
C-V—Front Hubs: Grease—fill hub monthly.
D—Fan: Light Grease—one turn of cup daily.
E-X—Cross Steering Tube: Light Grease—one turn of cup daily.
F—Gear Case: Cylinder Oil—one gun weekly.
G—Water Pump: Light Grease—one turn of cup daily.
H—Oiler: Cylinder Oil—never let it get empty.
I—Crank Case: Cylinder Oil—drain every 1000 miles and refill.
J—Clutch: See car instructions.
K—Clutch Trunnion Grease Cup: One turn daily.
L—Transmission: Grease, or see car instructions.
M—Universal Joint: Grease—fill monthly.
N-FF—Intermediate Brake Shaft: Machine Oil—few drops weekly.
O—Torque Tube: Grease—one turn cup daily.
P-JJ—Spring Pad: Light Grease—one turn cup daily.
R-KK—Rear Hub: Grease—fill hub monthly.
S-LL—Brake Shaft: Machine Oil—few drops weekly.
W—Magneto Coupling: Machine Oil—few drops daily.
Y—Magneto: Dynamo Oil—weekly at oiling points.
Z—Side Steering Tube: Grease—pack joints yearly.
AA—Timer Shaft: Light Grease—one turn cup daily.
BB—Timer: See special instructions for car.
CC—Steering Gear: Light Graphite Grease—fill monthly.
DD—Control Shaft: Machine Oil—few drops weekly.
EE—Drive Shaft: Light Grease—one turn cup daily.
GG—Rear Axle: Grease, or see instructions for car.

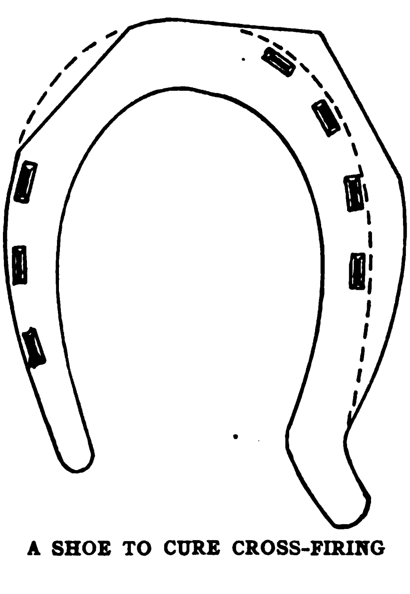
are good, steady, regular and trustworthy. It is not an uncommon occurrence for the molders in German workshops to work on an engineering order from England, and use the original drawing with the English measurements. The workmen rarely make suggestions, nor is there any system of encouraging them to do so, but they adhere strictly to the rules and do not shirk. They do what they are told to do and do it well. Partly to this can be attributed Germany's industrial activity.

Cold Tire Setters and Why Some Smiths Find Fault With Them

FRANK PARKER

Have just read the current issue of THE AMERICAN BLACKSMITH, and note the different views on cold tire setting, which are amusing to a man who has used one. You will notice that most of the men who find fault with them have never used one. Of what value to the practical man would be an article on shoeing written by a man who had never shod a horse? Cold tire setters are a success. I have used most all of the different edge grip machines and they will all do the work that they are intended to do. But they won't wedge spokes or put in new bolts, spokes or rims. A man has to learn to use a cold tire setter the same as he does a hot one. The only difference is that he can learn it quicker. However, a man should never expect a helper to do the work of a blacksmith on a cold setter. One can do some mighty bad work with a cold setter, but with the proper care and the proper skill he can do it equally as well and two or three times as quickly as he can the old way. When we first purchased a cold tire setter, five years ago, this section of country was prejudiced against them on account of an inexperienced blacksmith having previously used one. Now we never have a man call for the hot process. We guarantee all our work and always make our guarantee good. In the summer and fall there is considerable tire setting, and for five or six wagons to come up at about the same time would overwhelm one with work if one only had a hot setter. But with a good cold setter it takes only an hour or two of work. I would like to set tires against some of these men that claim a cold tire setter is no good. All these statements about crushing the rim, kinking the tire, etc., are absurd. It is a case of using some common sense. A tire set tight on a wooden wheel is smaller than the rim, no matter how it is set. As far as dishing a wheel is concerned, that is a matter of experience and common sense also. The cold setters used by a good workman will do good work. I would not run a shop without one. The cold tire setter is the blacksmith's best friend and it has come to stay. So, brothers, get one and do your work better and quicker; be progressive; keep abreast of the times.

A MODERN PHILADELPHIA SHOEING SHOP

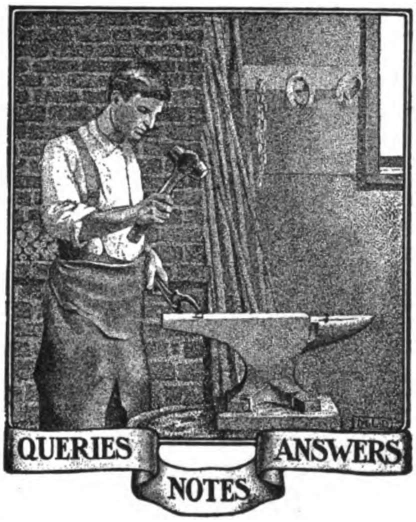


A SHOE TO CURE CROSS-FIRING

A Modern Philadelphia Shoeing Shop

HENRY IRWIN

I have been interested in the pictures of shops from different places. Here is a picture of my horse-shoeing shop. Have always been up-to-date with the latest labor saving devices. All of my fires are blown by electricity, and after trying out one of the late model L. S. P. calking machines I installed two more. The picture shows the three in operation. This should be evidence enough of what I think of the L. S. P., of which I read so much in your advertisements.



Shoe for Cross-Firing—We have a horse that cross-fires quite badly. Several shoers here have had a try at him, but none have succeeded in entirely curing him. Can some reader describe or picture a shoe which will be suitable in this case? The animal is a pacer and cuts his quarters badly when driven at speed.

James Bros., Ohio.

In Reply—The case described is very similar to one we had in our shop some time ago. After a little experimenting we decided that a shoe as shown in the accompanying engraving was the proper one to use. The animal now goes clear and travels at speed and under all conditions of road without touching himself. The key to the situation seems to be to make the animal break over at the inside toe. The solid lines show the outline of the shoe while the dash line shows the outline of the hoof and its position on this shoe. There may be other shoes for treating this trouble, but this one is certainly effective.

H. A. L., New York.

A Note from Kentucky—I am a regular reader of The American Blacksmith and think it is the best paper of its kind that I have ever seen. I like the ten questions about as well as anything, but also like the articles on shoeing and tire setting. Would like to see more about modern machinery, as that runs in my line. I am just a young smith and could not do without the paper. I have a large shop with all the necessary tools and also an 8 H. P. gasoline engine and grist mill, and all kinds of wood-working tools. My helper and I are busy all the time. I am situated in a small village.

Lacy Kramer, Kentucky.

To Harden Calks—I would like to ask through the columns of The American Blacksmith a receipt for hardening iron calks on shoes, i. e., something that I can use without wasting any time. Would prefer a liquid bath.

A. L. Shaw, Pennsylvania.

In Reply—Try the following: Heat to a red, and roll in a mixture of equal parts of prussiate of potash, sal-ammoniac and saltpeter, pulverized and well mixed. Then plunge while still hot into a bath containing 2 ounces each of prussiate of potash and sal-ammoniac to each gallon of water. Or try this: Rub the calks with ordinary yellow soap and then heat to a cherry red. Then plunge into a can of kerosene. The oil will not ignite, though a naked light should be kept away from it. The calks should be plunged into the oil and below the surface quickly.

F. G. H, New York.

A Shoeing Question—I would appreciate advice on shoeing a striker. I have several that cut their ankles, and I have never failed on one yet until I got hold of this one. The other smith put a calk on the inside, but I don't like that plan. Seems to me that would wrench the foot. It did not stop the striking. I have shod for the last ten years. Please give me your advice on it, and let us have more shoeing talk through the paper. That is the first I look for, for I think it is the most important in the blacksmith line, for the horse's foot should have particular attention.

I wish something could be done to prevent men who know nothing about the trade from running shops, for I see so many horses' feet ruined by cutting the outside wall to fit the shoe. I fit the shoe to the foot and not the foot to the shoe, and I think it is a bad idea to burn the foot with a hot shoe. I never put a hot shoe to the foot. I can take my tools and level the foot without it, and should the time come when I cannot level the foot without burning it, I will stop shoeing.

From Georgia.

A General Shop of Ohio—The accompanying engraving shows the interior of our shop. We do general blacksmithing and have a great deal of horseshoeing. I surely enjoyed E. W. P.'s article on interfering. He has our method exactly. We don't think that side-weights are of any value in stopping interfering. The less iron you use in shoeing the better it is for the horse and the easier it is to stop him from cutting.

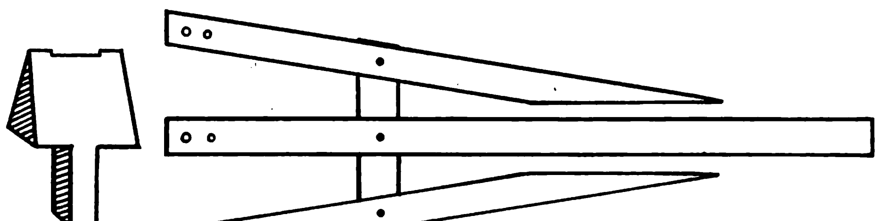
We use a House cold tire setter, with good success, and have set a great many tires over on it that were set the old way. You must understand your machine to do good work.

For power we have a 3 H. P. gasoline engine. We run an emery wheel, a large grindstone, a drill and a rip saw. Our engine is surely a good helper in the shop.

We receive $1.20 for shoeing and use the Juniata shoe. Would like to read more on horseshoes by E. W. P. We are located in Southwest Ohio near Indiana.

Davies & Lacey, Ohio.

MESSRS. DAVIES AND LACEY, TWO OHIO KNIGHTS OF THE ANVIL IN THEIR POWER SHOP



A B

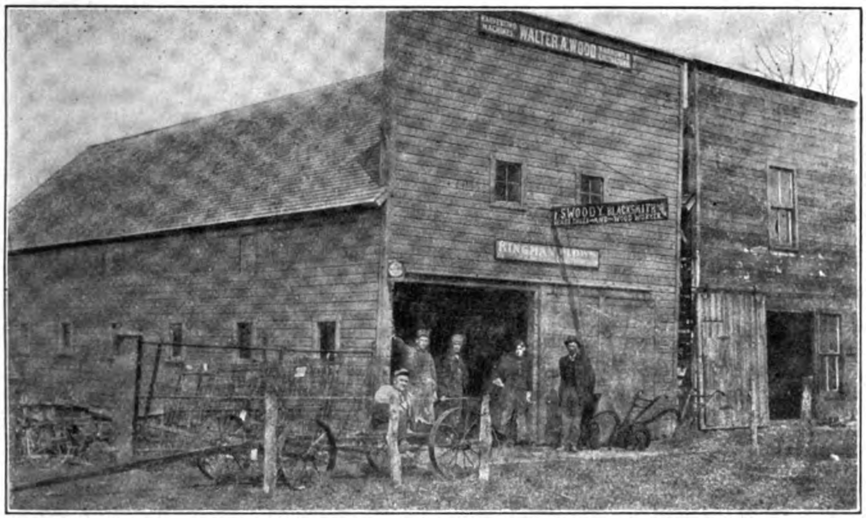
TWO PRACTICAL HINTS BY A PRACTICAL TENNESSEE SMITH

Two Practical Hints—I notice that you want some one to kick a little about the contents of The American Blacksmith. Of course, folks get tired of a good thing all the time, so I will give them something common. I get so many good little kinks from the brother smiths that I feel like giving something in return. The corkscrew for pulling broken spokes out of wagon hubs was a good one, if it was from Missouri. I will tell the boys how I fixed the hardy for the cutting of shoes. I sharpen the center and leave the outer corners dull. The hammer strikes the dull or blunt parts first, as they are the highest, and does not dull the sharp place in the center. A cold chisel will work the same way for cutting small stuff on top of the anvil and will not dull the chisel.

I have a good way of preventing an arch axle buggy from breaking the reaches and fifth wheel. I use a third reach in the center, running from the lower end of the king bolt to the center of rear axle where I fasten it with a clip such as the springs are put on with. Clip off the bolt in the center of the spring to get it out of the way and leave it in the spring to keep the leaves or plies from slipping sideways. The reach should have heavy iron on bottom so it will bear the back pressure. All three should be tied together as shown at B. The short forked brace may be taken off or left on as may be desired. This is good on all buggies, but is needed more on the arch axle kind.

Wm. V. Gist, Tennessee.

To Repair a Cracked Water Jacket—One of my customers was able to buy a gas engine very cheap, because the jacket had burst last winter. The engine, except for



AN IOWA GENERAL SHOP RUN BY MR. F. S. WOODY. HE ALSO HANDLES FARM IMPLEMENTS

the cracked water jacket, is in good condition. Can some brother tell me how to repair the crack so the engine can run as it should? Can I braze the crack? It is too wide to rust together.

M. A. Wood, Kansas.

In Reply—We have had several jobs of this kind in the past few years and so far not one of our repairs has failed. I have an engine in my own shop that has been in daily use over eighteen months since the crack was repaired. We solder the cracks as follows: First prepare some soldering acid by putting some small pieces of zinc into muriatic acid and allowing the acid to cut all the acid it can. Also have a good soldering iron and a bar of good solder. Now prepare the crack. Scrape all the paint from the vicinity of the crack, also remove all rust, grease or other dirt from the sides of the crack. The fact that the crack is wide will make cleaning so much easier. It is well to remember that time and trouble spent in cleaning the iron before soldering will save two or three times the trouble later on and insure a good job.

When sure that the crack is perfectly clean, or when it is just as clean and bright as you can make it, heat the metal in the vicinity of the crack with a blow torch, being careful not to blacken the sides of the crack. If you will pass the flame up and down the outside surface of the jacket, and not allow it to go right into the crack, you will not blacken up the sides of the crack. If you haven't a blow torch, heat a piece of iron in the forge and lay it on the crack until the sides of the crack become hot.

Now apply some acid to all sides of the crack. Then with soldering iron quite hot and well tinned load up the crack heavily with solder. If you have used care, have kept the crack clean and have heated it properly your job will be satisfactory and make the engine again usable.

Wm. H. Headly, Pennsylvania.

A PENNSYLVANIA POWER SHOP ON A BUSY DAY

To Brown Gun Barrels—Can someone tell me how to give gun barrels the brown finish that seems to be very much in demand here. The hunting season will bring in quite a little of this work. The old hunters up here say the ordinary bright barrel is more likely to startle game than the brown barrel, but they cannot tell me how to get the brown finish right. If I could do this work it would enable me to keep quite a bit of money in town that is now going to the factories.

L. H. Bowen, Canada.

In Reply—The brown finish on gun barrels is merely a rusting of them, with treatment to prevent further rusting. First prepare the following mixture very carefully. Some of the ingredients are deadly poisons and the finished mixture should be labeled "Poison" and kept where it cannot be mistaken for something else. Use a glass or earthenware jar or crock for mixing the following: ¾ ounce spirits of niter; ¾ ounce tincture of steel; ¼ ounce crude brimstone; ½ ounce blue vitriol; ¼ ounce corrosive sublimate; 1 drachm nitric acid; ¼ ounce copperas; 1½ pint rainwater. Mix thoroughly and put in a bottle that is plenty large enough to hold all of the mixture. Don't cork up the bottle until you are certain that the liquid is thoroughly mixed. And don't forget to put a large "Poison" label on the bottle—also that the liquid is a barrel browning mixture.

Now, barrel is prepared as follows: After polishing the barrel just as bright as possible rub it with a cloth into which some lime has been rubbed. This will remove all grease from the surface of the barrel. Now take some very fine emery cloth and go over all parts of the barrel until perfectly clean. Make a swab by tying a sponge or cloth to the end of a stick and apply the browning fluid with this swab, being careful not to get any of the fluid on the hands or clothes. After the entire barrel has been thoroughly rubbed with the saturated swab, lay the barrel aside for about 24 hours. You will find that it is then covered with rust. Rub this off with a woolen cloth. If the color is not dark enough apply another swabbing and let lie for another 24 hours. Now use a scratch brush to remove the rust and clean up the barrel thoroughly. Then apply linseed oil, rubbing hard. This will prevent further rusting and bring out the beauties of the barrel.

Before beginning operations on the barrel it should be taken from the stock and both ends should be plugged with wooden plugs having handles. The handles are used for holding the barrel, as it should not be gripped with the hand during any stage of the operations.

J. E. C., New York.

A Pennsylvania Power Shop—The accompanying engraving shows my shop, which is 22 by 40, two stories, equipped with a 6 H. P. gasoline engine, an emery wheel, a rip saw, a band saw, a drill press, a power blower and all the necessary tools for an up-to-date shop. The only shop in a good, healthy country town of about 2500 inhabitants.

Jacob P. Holzapfel, Pennsylvania.

From An Iowa Smith—I am a subscriber to our good friend The American Blacksmith and always look forward to its coming with eagerness and interest, for I have found some very valuable helps as well as interesting letters in it. We smiths cannot estimate the assistance we can be to each other through this magazine.

I am interested in tire setting, have lots of it to do and would like some cold tire setter user to give his way of setting rubber tired wheels and also his way of getting the rubber off and back on again after the tire is set. On buggy tires I always shrink half on each side so that the old holes come in the same position as before. I sometimes get a wheel that has double holes half way around where the tire has been heated and shrunk all in one place.

I have a new two-story shop, 22 by 60, cement floor, pump in good well attached to 4 H. P. engine, also have all the power tools. Six months of the year I employ a helper. My trade is of the very best. In addition to my general blacksmithing work I am handling farm implements and, although I find it a paying investment, still it takes up much of my time.

F. S. Woody, Iowa.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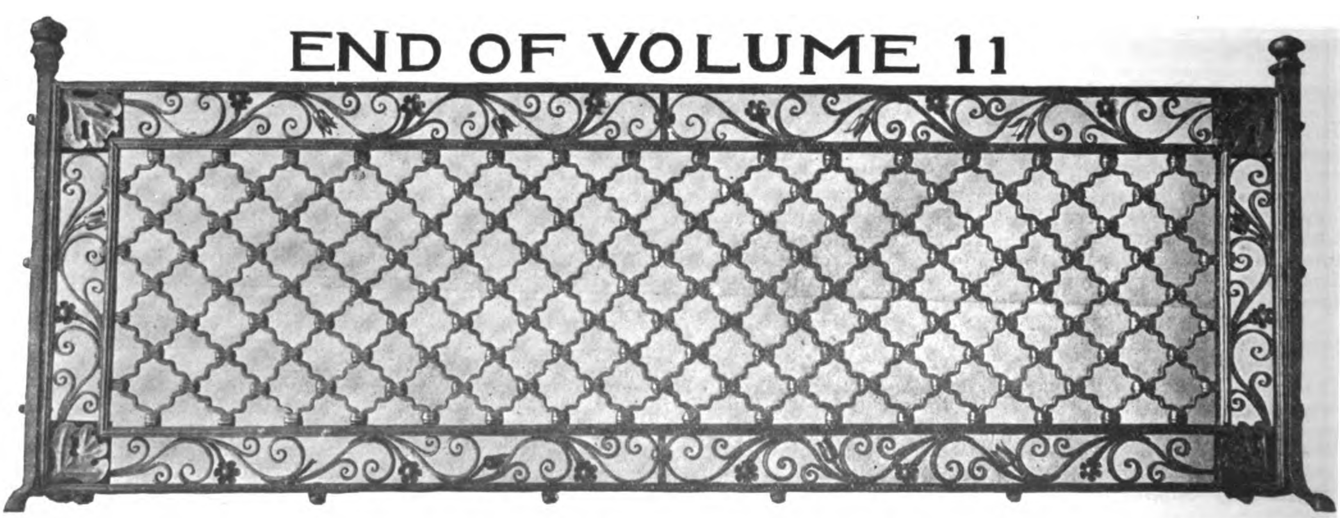

END OF VOLUME 11

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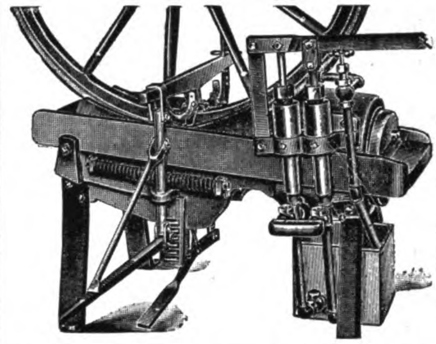

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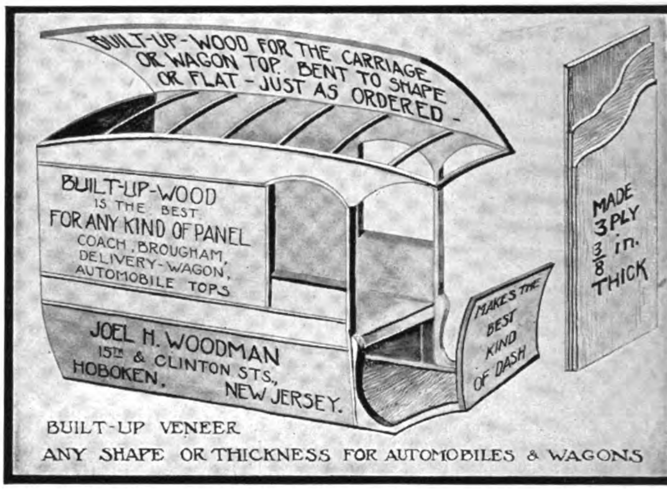
Gentlemen:—"My 200 Blower is giving perfect satisfaction. It is just what you claim it to be. I have used several different makes. The C—— is considered the best around here. But they are not in it any more. This gives the greatest blast of any blower its size I ever saw. I am not troubled with clinkers any more. If all the smiths could realize the good qualities of such machinery, every shop in old North Carolina would have a Buffalo in it."

(Signed) J. E. Tarkenton,
Creswell, N. C.



"Capewell" Nail Points

1 "Capewell" nails DRIVE EASIEST, thus saving time and trouble.
2 They HOLD BEST—the nail that holds the shoe holds the customer.
3 Are SAFEST to use. They do not split or crimp in driving.
4 Every nail in a box of "Capewell" is perfect. The shoer gets FULL VALUE.

Made by
The Capewell Horse Nail Company
HARTFORD, CONN., U. S. A.
Largest Makers of Horse Nails in the World

Infringers, Beware!

This is to notify manufacturers or users of EDGE GRIP HYDRAULIC TIRE SETTERS of any other make than SCIENTIFIC or PERFECTION that we own the original Patent on this type of tire setter, also later Patents, and that we propose to protect our rights under said PATENTS by bringing suit against all parties infringing same, whether manufacturers or users.

Lourie Manufacturing Company, Springfield, Ill.

Successors to
National Hydraulic Tire Setter Co., Keokuk, Ia.

P. S.—If you want a HYDRAULIC TIRE SETTER fully protected from suit and with the best possible features to be found in such a machine, get a

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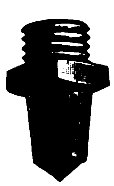

Use **Suregrip Calks**

There is no other calk as good as the Suregrip.

Demand them from your jobber.

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THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A. — NOVEMBER, 1911 — $1.00 A YEAR 10c A COPY

VOLUME 11 NUMBER 11

THE AMERICAN BLACKSMITH

A Practical Journal of Blacksmithing and Wagonmaking

BUFFALO N.Y. U.S.A. AUGUST, 1912 $1.00 A YEAR 10c A COPY

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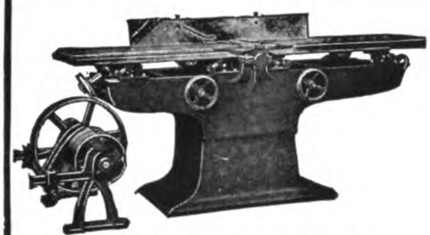
365 BROADWAY SALEM, OHIO.



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**Five Sizes—8, 12, 16, 20 and 24 inch.
New "patent applied for" features.**

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Sharp competition demands economy in your shop methods. You can only charge so much for a certain piece of work. If your special tools and machinery enable you to turn out that work considerably cheaper than you could do by the old methods by hand, you have just so much more money in your jeans and you're just that much further ahead of your competitor.

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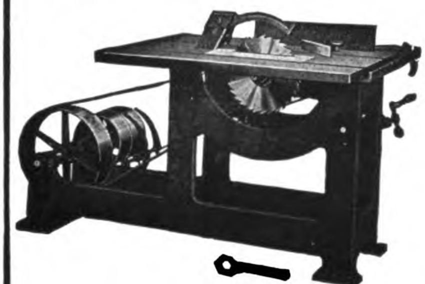
Silver's Forges, Drills, Carriage Makers' Tools and Wood Working Machines will earn more money for you because they have positive high grade quality and sell at a moderate price.



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Send for circular of Saw Tables and Swing Saws.

SEND TODAY FOR MACHINERY CATALOG

or for any of the following booklets:

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DRILLING MACHINES—Covering our new line of ball bearing post drills.

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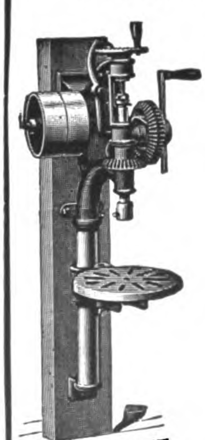
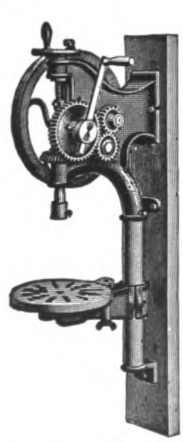
NEW PLANETARY BAND SAW
20-inch Foot or Combination.





Our Booklet, "Drilling Machines," illustrates several kinds we make.

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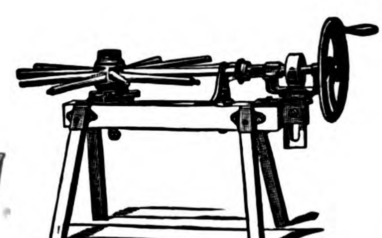

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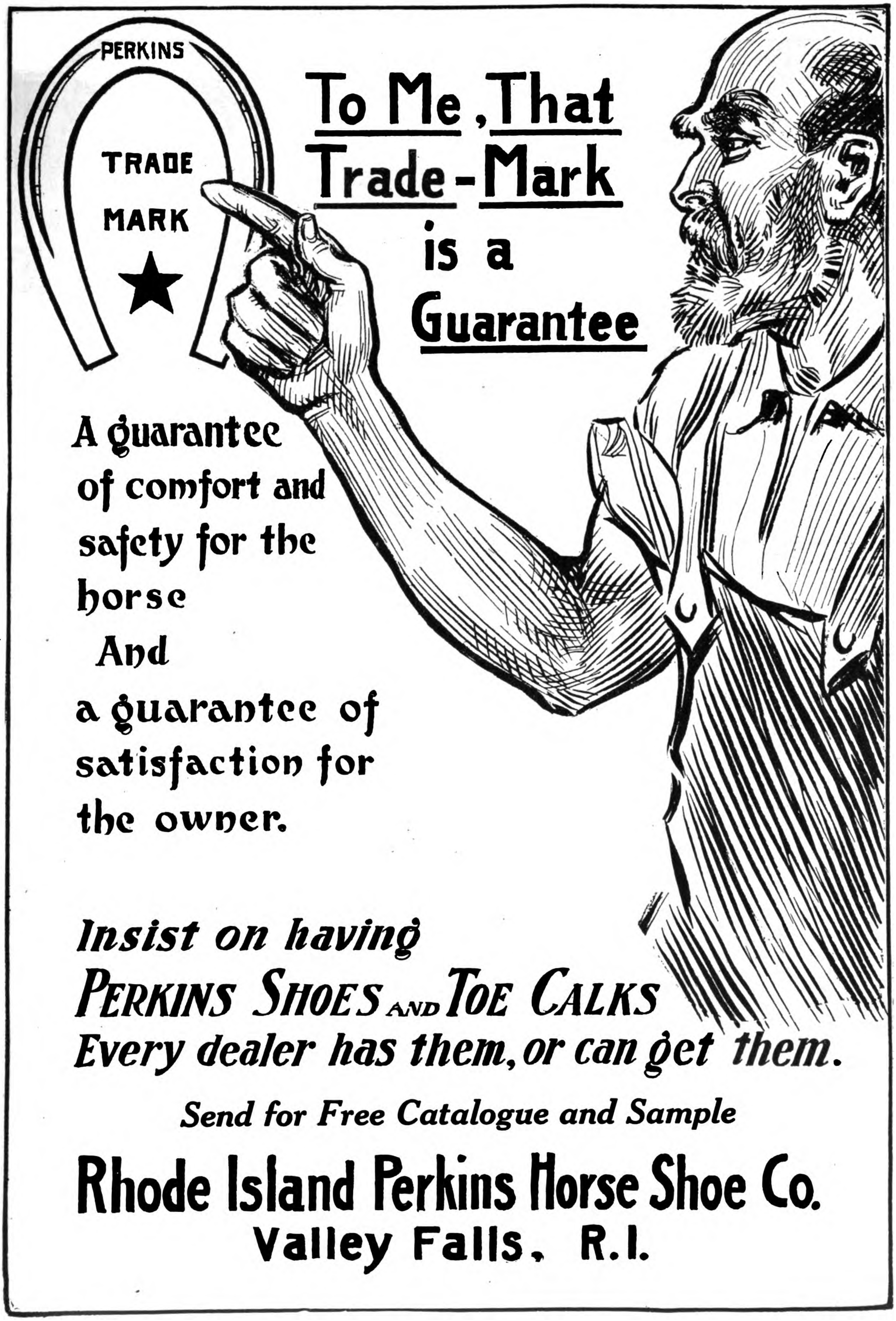
in Seven Sizes. Fitted with Star Hollow Auger.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To Me, That
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is a
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A guarantee
of comfort and
safety for the
horse
And
a guarantee of
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the owner.
Insist on having
PERKINS SHOES AND TOE CALKS
Every dealer has them, or can get them.
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The most popular forge of to-day.
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For power shops, or where a forge for heavy work is desired.
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For garages, boiler makers, horse shoers or any first-class forge shop.
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One fire variable speed blower.
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Fire Pot 8x 9½x4 in. inside.
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Spur gears used only. Ask the man who owns one.
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The largest and most mechanically perfect post drill manufactured. Equipped with high-class powerful motor directly connected with spur gear drive.
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20-inch upright drill gear driven. No belts. Has hand lever feed, also power self feed with automatic stop.
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It can be operated toward the front or back. Depth of throat 6 inches.
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The easiest operated shrinker in the world.
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Please send me a free copy of your 160-page Tool Catalogue.
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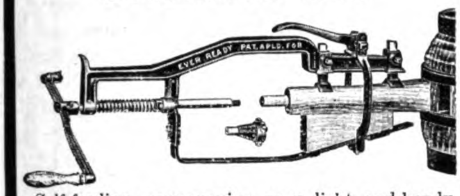

Self-feeding, easy-running, very light and handy. Uses any spoke auger. Clamps the spoke accurately and bores tenons just as desired, and sold very cheap, less than $5.00. It is a "Gem" and fills a long felt want. For sale by all jobbers.

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The Kelly Jr. Hollow Auger
The Latest and by far the Best.

It simply bores the hardest spokes like cutting butter. It cuts tenons from ¼ in. to 1½ in. in diameter, 4 in long..

They are the easiest of all augers adjusted, being so very simple, possessing as they do many valuable improvements, yet sold at a very reasonable price. Write us for particulars.

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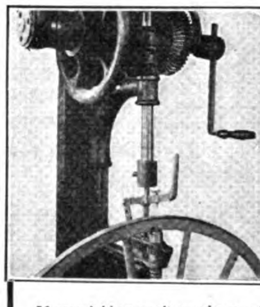

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Has lever to keep bolts from turning. Has steel gears and steel socket wrenches 3-16" and ¼" and is made from best material; will last a life time. Will remove burrs from one wheel in 40 seconds. This wrench can be attached to any post drill, either hand or power, in two seconds.

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Manufactured and patented by

BARNEY LANGLOTZ - - Bangor, Mich.

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"NEW EASY" 4 Sizes — "EASY" 2 Sizes

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KNOWN AND PREFERRED EVERYWHERE

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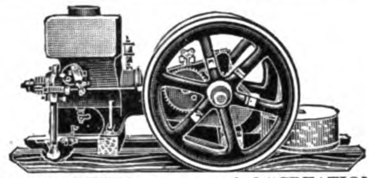

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but the net result of over 20 years' practical experience building GASOLINE ENGINES. That is what enables us to combine QUALITY and LOW PRICE, as follows:

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Less 10 per cent for **cash with order**

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are making work easy in hundreds of shops. They are easy to install, require a minimum amount of attention and operate at low cost. Fully described in Bulletin No. 161.

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GOES LIKE SIXTY
SELLS LIKE SIXTY
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$60
GILSON GASOLENE ENGINE

For Pumping, Cream Separators, Churns, Wash Machines, etc. **FREE TRIAL** Ask for catalog—all sizes

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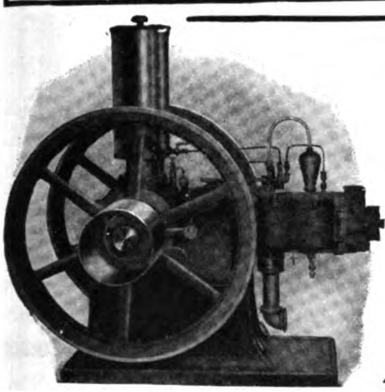

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Operate on Kerosene, Fuel and Crude Oils

No Valves, Electric Devices, Carburetor, Cams, Gears, Etc.

Simple, Safe, Reliable, Durable and Economical

3 H. P. Mietz & Weiss Oil Engine, using oil at five cents per gallon, saves $84.00 per year over the gasoline engine, using gasoline at twelve cents per gallon. This represents a capital of $1,680 at 5% interest.

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AUGUST MIETZ
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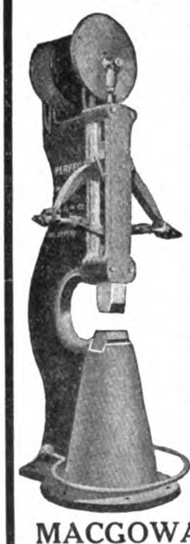
The Perfect Power Hammer



Note the difference in construction over other makes.

Extra Long Guides, insuring a direct movement of the ram without any side motion, which causes guides and springs to break on other hammers.

The only Hammer made with a disk attachment with special anvil for sharpening harrow and plow disks.

A recently invented **Friction Clutch** fitted with **Ball Bearings** absolutely controls the operation of the Hammer by foot pressure from the lightest tap to the heaviest blow. This ease of operation makes the hammer particularly well adapted for plow work, as you can get as light a stroke as you desire.

Will ship to any responsible party on approval. If not as represented, no sale.

Made in Two Sizes:

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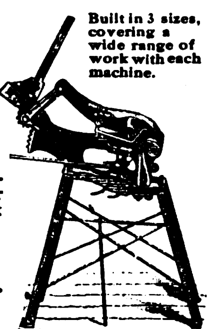
A Sears Machine Should Be In Every Shop

The greatest time and labor saving machine ever invented for use in the blacksmith or repair shop. The Sears Punch-Shear and Cold Tire Setter has proven to be the best machine of this kind made. Hundreds in use.

Try This Machine in your own shop. If, properly worked, it does not do all we claim, return at our expense. It will not cost you a penny.

Built in 3 sizes, covering a wide range of work with each machine.



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For twenty years the Two Leading Low Priced Shears in the U. S., representing the Greatest Value for the Least Money.

No. 5, weighs 200 lbs., cuts 4 x ½ inch soft steel
No. 10, weighs 430 lbs., cuts 4 x ¾ inch soft steel

At their price you should have had one long ago. Order One from the first iron man that calls on you. They All Sell Them.

Write for descriptive circular and prices.

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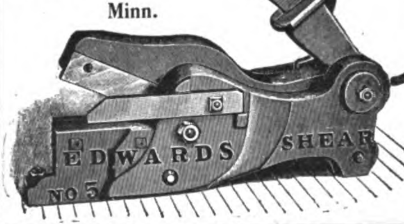

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1000 STYLES AND SIZES

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CAROLUS BOLT CLIPPERS AND NUT SPLITTERS

The most simple, complete, practical and durable tools of the kind you can buy. Three different styles, as shown by the cuts below. Insist on Carolus tools if you want the best. Order from your jobber, or, if he cannot supply you, write us direct.

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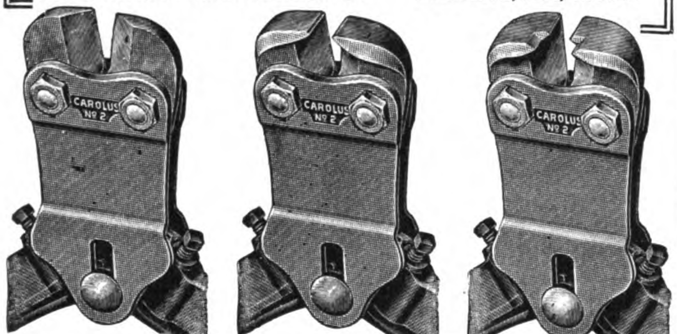

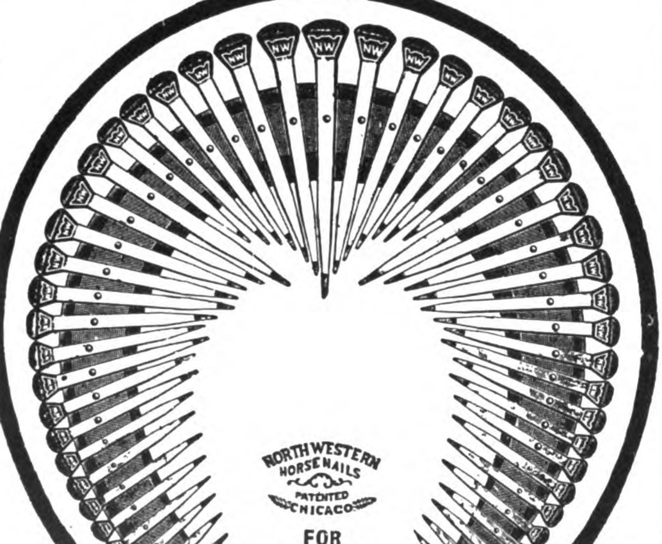

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STRENGTH
SAFETY
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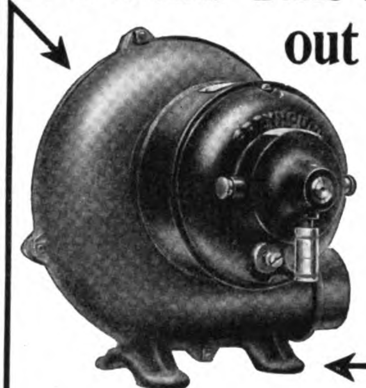
QUALITY OF MATERIAL.

Northwestern Horse Nails
ARE THE BEST ALL AROUND

The most perfect in form and finish. Made of the best Swedish Iron. Will hold a shoe longer than any other nail made. Note the re-enforced point—makes it easiest to drive and the safest to use.

UNION HORSE NAIL CO., CHICAGO, ILL.

We Send This Blower Without a Cent Down



You Can Use It and Return It If Not Entirely Satisfied

THIS Greyhound Blower is the highest quality electric blower made. "It Blows Like Sixty". Blacksmiths who have used them would not return to the old hand method for anything.

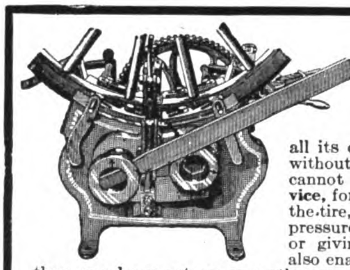
They are made in two sizes, for large and extra heavy requirements, to operate on A. C. or D. C. electricity. The outfits are complete and can easily be installed by anyone.

We want every blacksmith to test one of these blowers, knowing absolutely that they will do all we claim and make **More Money Every Week** for them. That is why

We will send you a Greyhound Blower of either size complete with rheostat, base, plug and wire and PAY THE FREIGHT to your city. If, after using it 30 days, you are not entirely satisfied, send it back at our expense.

A fairer, more liberal offer could not be made. Write for prices today.

Crescent Electric Manufacturing Co.
1720 Columbus Road **Cleveland**



THE BROOKS
COLD TIRE SETTER

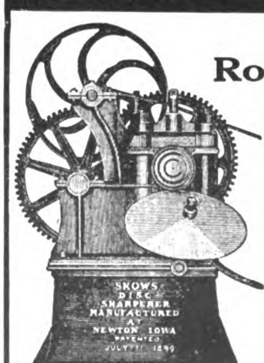
has all the good points of all the others, besides many good points all its own; such as **Circular Movement,** without which a successful Cold Tire Setter cannot be built; **Automatic Gripping Device,** forcing a **continuous** pressure against the tire, thereby enabling you to use less side pressure and thus avoid cupping the tire or giving it a side pressure upset, which also enables you to upset wider thin tires than can be upset on any other machine.

We Guarantee the Brooks Will Do Better Work than Any Other Edge-Grip Cold Tire Setter Made.

Write your **Jobber, today,** and he will tell you **why** the Brooks is superior to all others, **why** there are more Brooks machines in use than of all others combined; **why** it is selected exclusively by the U. S. Government and foreign governments, and **why** you should buy a Brooks **Now.**

The Brooks Tire Machine Co., Wichita, Kan.

The Best Way to Sharpen Discs



Skow's Rotary Disc Sharpener

It sharpens cultivator and plow discs of all sizes by cold rolling which gives a better edge, that will stay sharp much longer than by any other method of sharpening.

This disc sharpener is a big money maker in any shop. One man made $28.00 in one day with this machine and others have done as well or better.

Over 500 are now in use in the United States and giving great satisfaction.

Ask your jobber about **Skow's Rotary Sharpener** or write us today, and we will mail you our circulars.

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95 cents
PLATFORM GEARS
50 cents
All sizes, to carry from 1,000 pounds to 5 tons
$1.95
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75 cents doz.
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10 for 50 cents
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We make 3/4 to 4 in. tread
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85 cents set
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SAVE ALL FIGURING!

Tell at a glance how much stock to use for oval or elliptical hoops of any size, the circumferences of circles, weight of flat, square and round stock, and the weight and strength of ropes and chains

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a practical man of long experience. Contains chapters on tools, shop equipment, welding, drilling, hardening, repairing, wagon work, plow work, steel work, boiler work, horseshoeing, with numerous recipes and tables.

The book is strongly bound in cloth, contains 190 pages, illustrated. Price, postpaid, $1.00, or 4/6.

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Do you know how to buy, work, temper, forge and harden it? Do you know how to make furnaces, and baths for heating and tempering it?

The American Steel Worker,

By E. R. MARKHAM,

will tell you all about steel manipulation. Mr. Markham has had over twenty-eight years of experience in steel working and he knows. His book gives you just the information you want on the subject of steel. It contains over 350 pages, and is well illustrated with many excellent engravings. The book is bound in green library cloth on heavy boards, with titles in gold, and will be sent postpaid to any address on earth for $2.50.

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DAYTON MALLEABLE IRON CO. D DAYTON, O.

Tell us your fifth wheel troubles. If your dealer does not know about the Dayton Fifth Wheel ask him to write us. Or write us yourself and give us his name.

Mr. J. J. Schweitzer, a Nebraska blacksmith, says: "I put the Dayton Fifth Wheel on all buggies I repair and on new jobs."

Mr. J. S. Abercrombie, an Idaho blacksmith, says: "I have three buggies to put in new fifth wheels now and am going to put in "Daytons" in place of the ones they had."

What these Blacksmiths have done, you can do.

The Dayton Malleable Iron Co.
Dayton, Ohio

THE DAYTON FIFTH WHEEL for Two and Four Passenger Pleasure Vehicles is sold only by Carriage Hardware Jobbers. Send all your orders to them.

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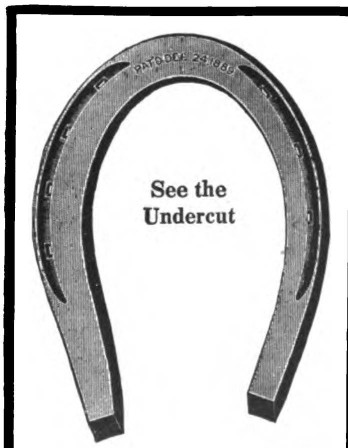
TRADE MARK

THE HARTFORD FAMOUS
Steel Side-Weight Horse Shoes

UNDERCUT CREASE



Weights—Tracks	Weights—Medium	Weights—Heavy
No. 1.. 7 oz.	No. 1.. 9 oz.	No. 1..11 oz.
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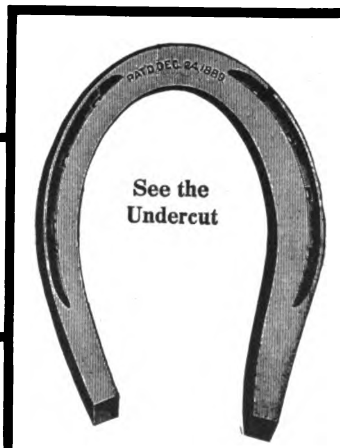
Packed in Wooden Boxes, 10 pairs in a box.
Also in 100 lb. Kegs. Assorted if desired.

ASK YOUR JOBBER

SIDE-WEIGHT HORSE SHOE CO.
Hartford, Conn.



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